SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXI.---No. 14. [NEW SERIES.] NEW YORK, OCTOBER 2, 1869. $3 per Annum [IN ADVANCE.]

The Gerner Steam Boiler.

This boiler was described and illustrated on page 97, Vol. XX., of the SCIENTIFIC AMERICAN. At that time we had no evidence to offer as to the power of the boiler to generate steam economically, except an opinion based upon the structure of the boiler, and the testimony of others whose opinions are valuable and trustworthy on such matters, and whose names we gave in full. Since that time we have had the opportunity to observe and test critically a stationary boiler constructed on this plan, now in operation at Paterson, N. J., and also to inspect a marine boiler made on the same principle now in operation at the General Office of the New York and Erie Railroad Company, in this city. We find that the stationary boiler will evaporate 10·65 lbs., of water at 212° into perfectly dry steam for every pound of anthracite coal consumed.

The experiment by which this result was determined was performed in the most approved manner—that adopted in the U. S. Navy experiments.

We are, therefore, now able to speak from actual knowledge of the merits of this boiler, and it is with pleasure that we re-open our columns to discuss an improvement calculated to produce a large saving in the consumption of fuel used for steam generation.

The sources of loss in steam generation may be included in two general classes; namely, imperfect combustion, and radiation. The reader will understand that we make a wide difference between steam produced in a boiler and steam consumption in an engine, and that the sources of loss in the latter are not to be considered, in estimating the power value of a boiler, since good results cannot be expected from the best boiler connected with a defective engine, nor from the best engine supplied with steam from a defective boiler. A boiler must therefore stand alone in any estimate of its worth; its evaporative power, compared with the coal consumed, and its comparative safety, being the principal points which challenge inquiry.

Its evaporative power will depend, of course, upon the extent to which the causes of loss above classed are eliminated, while its comparative safety may be inferred from the nature of the materials used in its construction, the character of the workmanship, and the removal of those faults of construction known to impair the safety of boilers in general.

The skilled constructor will make safety the primary consideration, and economy the second That the reader may comprehend the successive steps by which the present form of the Gerner boiler has been reached, he is referred to Figs. 1 and 2 of the accompanying engravings.

The inventor of the Gerner boiler, starting with the assumption that, so far as safety alone is regarded, no form of boiler is superior to the old-fashioned cylinder, has proceeded step by step to develop its steam-producing power without relinquishing its known elements of safety. The Figs. referred to give, respectively, an end and side view of a plain cylinder boiler, set in brick-work, W L being the water line, and from X to X, around the lower section of the boiler, showing the extent of heating surface.

Figs. 3 and 4 give two views of the same boiler, with its power and economy greatly increased by the application to it of the Gerner Reinforcement, an application that may be made to any plain cylinder or flue boiler. The Gerner Reinforcement consists in placing within a cylindrical boiler another cylinder of just sufficiently smaller size to leave a space (when set a little out of center) of about four inches at the bottom and ends, increasing gradually to about six inches at the top. This cylinder, by displacing the large mass of water as shown in Fig. 2, reduces it to a thin sheet, which fills the space between the two cylinders, and entirely surrounds the inner one; the water line being now near the top instead of the middle of the boiler. The inner cylinder is simply supported at each end by a bracket attached to the outer boiler, and is provided with a dome, open at the top, setting within the dome of the outside cylinder. The steam, as it is generated, rises, as shown by the arrows in Fig. 4, into the outer dome, and thence passes by the inner dome or conducting pipe, into the interior of the inner cylinder, which thus becomes a large steam reservoir entirely filled with dry steam, which is kept in its normal condition by the jacket of hot water which surrounds and protects it from radiation, the temperature which protects being the same that produced it.

The supply pipe, E, conveys the steam as it is required, from the center of the steam reservoir, thus acting as a steam trap to convey only dry steam, were not the essentials to that condition already complied with.

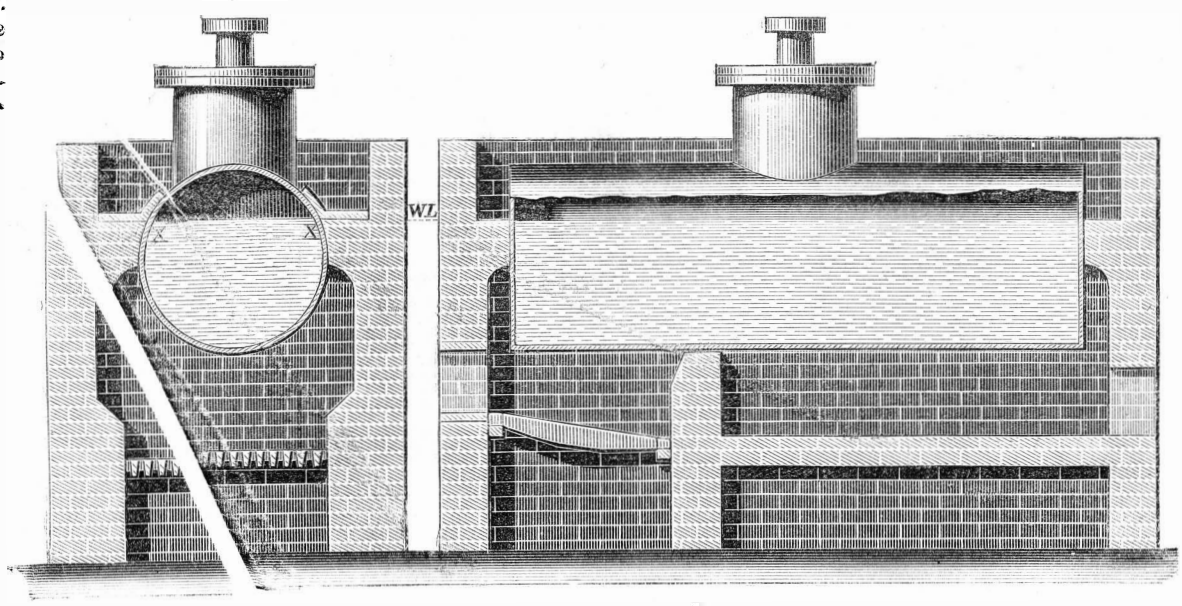
It will be observed that the pressure of the steam within the reservoir equalizes that of the steam in the water outside, thus obviating the necessity for "staying" and the use of heavy iron in its construction.

The water being carried so high in the boiler admits of the brick-work being set off from it, and the fire thus carried entirely around it, throughout its entire length and ends, thereby doubling the extent of heating surface. The brick-work may be thrown in an arch over the boiler or the successive layers of brick "stepped in" like a reverberatory furnace, as shown in Fig. 3.

It is obvious that among the advantages gained by the Gerner Reinforcement are, first, doubling the heating surface; and, second, the thin sheet of water presented to the action of heat instead of a large mass, by which steam is not only generated much more rapid-

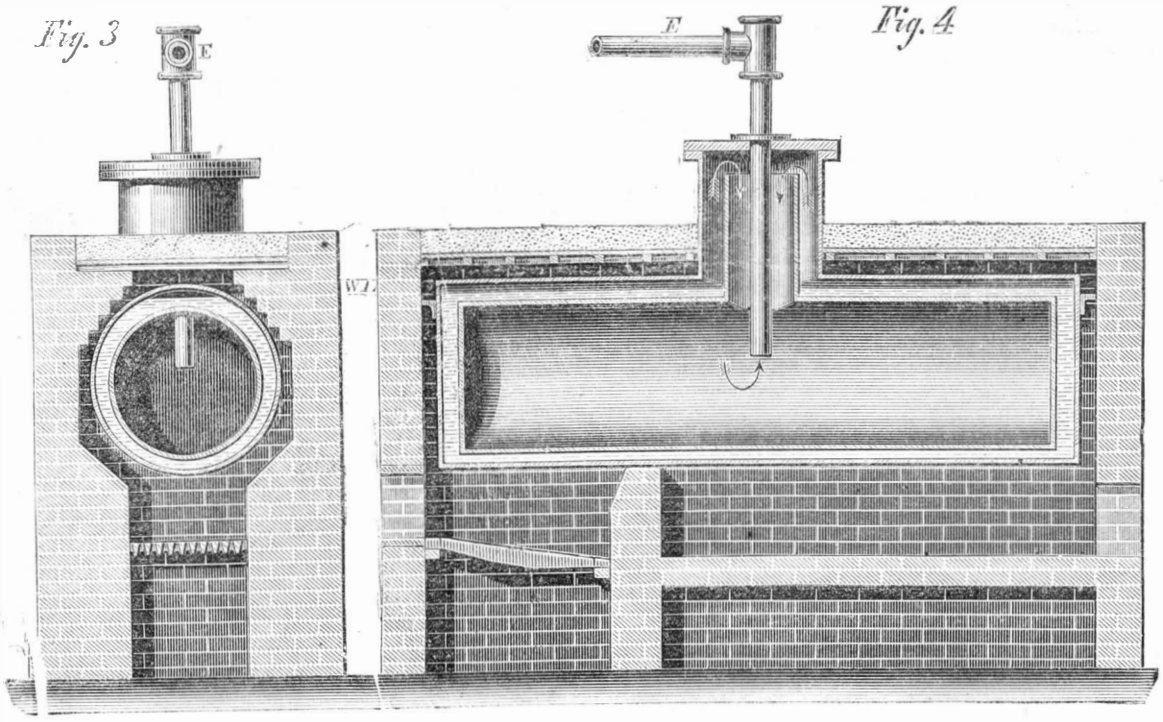
Fig. 1

Fig. 1 Fig. 2



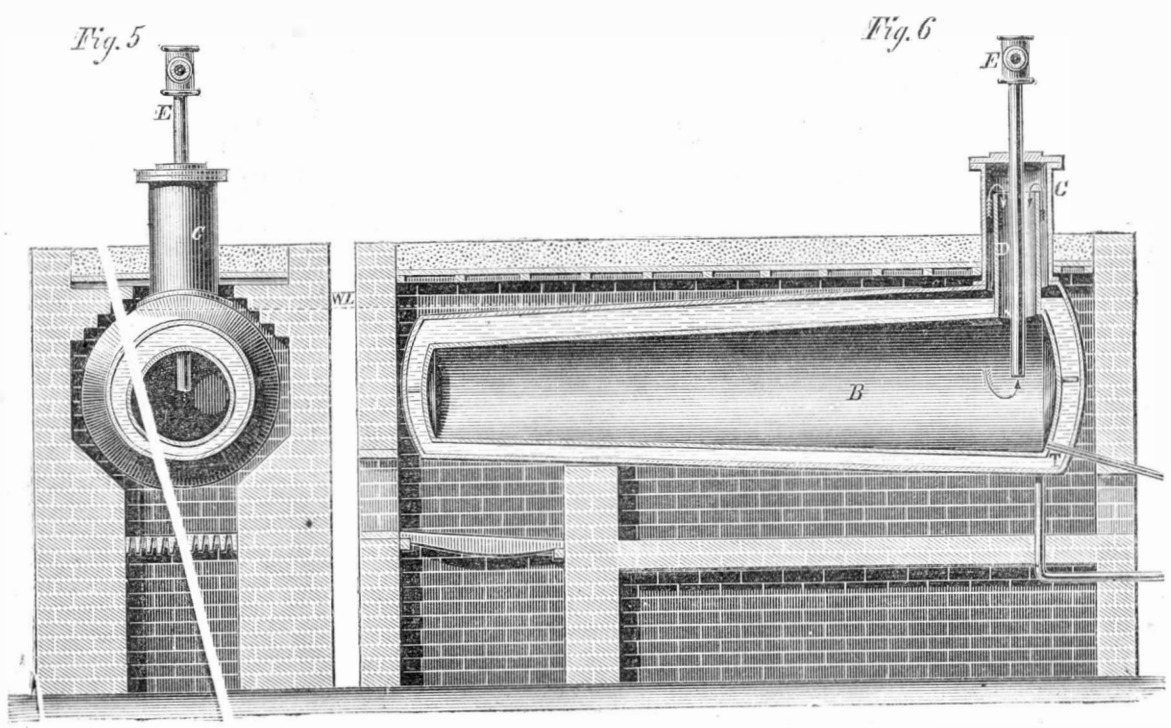
COMMON CYLINDRICAL BOILER.

Fig. 3 Fig. 4



THE COMMON CYLINDRICAL BOILER WITH THE GERNER REINFORCEMENT ATTACHED.

Fig. 5 Fig. 6



THE GERNER STATIONARY BOILER.

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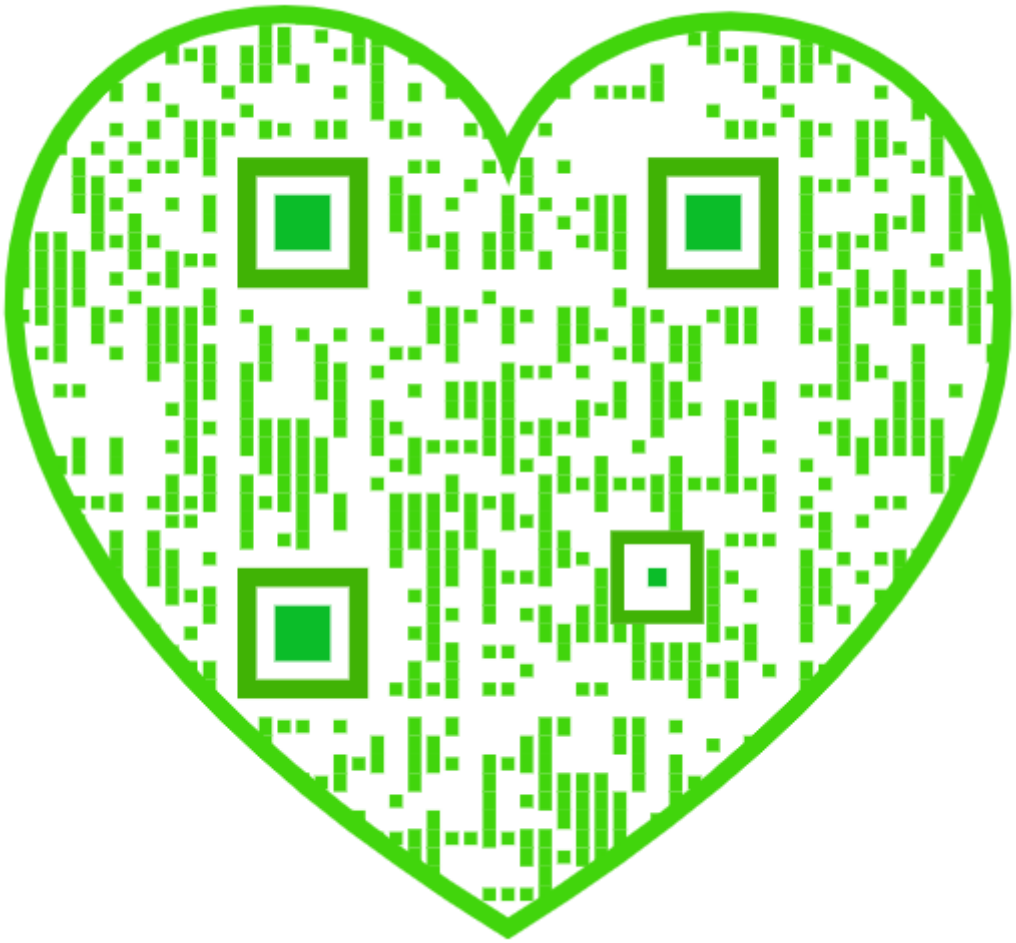

ly and economically, but the lessened volume of water materially increases the safety of the boiler. If authority for this statement be asked, we refer the reader to C. Wye Williams' able work on "Heat and Steam," page 171, where he asserts that "the risk of explosion is greatly increased by the increase of water in the boiler, every cubic foot of which, beyond what is absolutely necessary for the generation of steam, being an additional source of danger."

A steam reservoir of great capacity is supplied where the steam is constantly protected from all extraneous influences, and its perfect dryness assured.

Figs. 5 and 6 are a cross-sectional end view and a vertical longitudinal section of the Gerner stationary boiler.

The shell consists of a cone-shaped cylinder, so called, its smaller end being over the grate. The boiler's axis is set level. The flame envelopes the boiler, and its escape is checked at the top and sides by a brick partition at the rear, and its exit is through a vent underneath the larger end of the boiler into the flue and chimney. Within the shell is placed a similar cylinder of less dimensions, leaving a water space of about four inches at the bottom, increasing to, say, six inches at the top. This water space surrounds the entire inner cylinder. The steam dome, C, receives the steam, passing it through the pipe, D, into the inner cylinder (steam reservoir), B, whence the steam finds exit to the engine through the pipe, E.

It will be seen by the foregoing description that all of the advantages described in the reinforcement have been maintained in the Gerner stationary boiler proper, and its efficiency and economy still further augmented by its conical shape.

The angle of the heating surface, as here presented to the action of the fire, is best calculated to catch and absorb the heat, impingement being more direct and effective, while the free circulation of the water from the position in which the conical shells retain it, is greatly promoted.

It will also be observed how scientifically this form provides an extensive combustion chamber, wherein the gases of combustion may become thoroughly ignited and the radiation from the fire strike very directly upon all sides of the cone, while the rapidly narrowing passage towards the escape flue, in both the vertical and horizontal direction, so progressively retards the gases in their passage to the outlet that their combustion is perfected and their heat, as far as possible, imparted to the boiler.

There is no lodgment for refuse, ashes, and dirt, of any kind, about the boiler, and all sediment within is naturally deposited at its lowest point, T, whence it is easily blown off.

The advantage derived from setting the boiler without contact with the brick work is great, for when, as is necessary with ordinary boilers, the brick-work and boiler are brought in contact, any water from the top will settle at the point of contact, become decomposed, and very quickly weaken the boiler by oxidizing the iron. The "Society for the prevention of Boiler Explosions," in England, report that fifty per cent of the explosions of stationary boilers are clearly traceable to this cause.

Unequal expansion and contraction are also, doubtless, as much promoted in a boiler but half bricked in, as in a tubular or locomotive boiler with its varying diameters and position of shell and tubes; for the upper half, exposed to the atmosphere, while the lower part is subject to intense heat, must be unequally affected, and soon lead to the rapid destruction of the boiler.

We have given above the results of a test on a stationary boiler of the Gerner construction, 10 feet long, 2 feet front, and 3 feet rear diameter, with a grate surface of $4\frac{44}{100}$ square feet, which show that the boiler is producing 500 lbs. of dry steam per hour for every 50 lbs. of coal consumed, after setting aside the fraction 0·65 of a lb. over 10 lbs of steam produced by the consumption of a pound of anthracite. This margin of 6·5 per cent of the total production, will cover many of the defects of unskillful firing.

Assuming, then, that in practice the boiler will evaporate 500 lbs. of water per hour with a consumption of 50 lbs. of coal, and allowing 33 lbs. of water to be the fair standard of a horse power, this boiler is capable of supplying 15-horse powers.

But it may be asked, how is this gain to be theoretically accounted for? As further answer to this inquiry, already partially met in this article, we may be permitted to make the following extracts from accepted authorities on steam:

"The present construction of the multitubular boiler, as it is called, may be truly stated as a disgrace to the science of this age of progress."—*Page* 29 "*Modern Practice of Boiler Engineering,*" *by Robert Armstrong. Revised by John Bourne.*

"Heat, communicated by flame, must depend on its mass."—*Page* 132 "*Treatise on Combustion of Coal,*" *by C. Wye Williams.*

"The tubular system is chemically, mechanically, and practically a destroyer of ignition and the sustained existence of flame."—*Ibid, page* 134.

"The result of the adoption of the multitubular system has been a less perfect combustion, a larger development of opaque smoke, a greater waste of fuel and heat, and a more dangerous application of it."—*Ibid, page* 122.

"Any expedient which supersedes the present flue, and multitubular marine boiler, will very considerably accelerate the passage between this country (England) and America.—*Page* 29 "*Modern Practice of Boiler Engineering,*" *by Robert Armstrong. Revised by John Bourne.*

It will thus be seen that practice and theory do not conflict, and that the results obtained by the Gerner boiler exactly coincide with what might be expected on purely theoretical considerations. Its structure is such as complies with the principles laid down by the eminent authorities quoted and comprehends them all.

The Gerner principle, as herein described for stationary boilers, is even more effectually applied to portable and marine boilers.

We have already said that a marine boiler (*i.e.*, built upon the same plan as one intended for a steam vessel), is now in successful operation at the New York and Erie Railroad General Offices (Grand Opera House), corner of Eighth avenue and Twenty-third street, New York. It is 16 feet long, 6½ feet in diameter, and has produced, according to the testimony of J. W. Brooks, Superintendent of Machinery and Motive Power, N. Y. and E. R. R., the—so far as we are aware—unparalleled result of 110-horse powers, 3,300 lbs. water evaporated per hour, with an economical result of over 12 lbs. of water to 1 lb., of coal, and at our visit to this establishment we were convinced of the very superior dryness of the steam produced.

We append a comparative statement of dimensions and economical results, a 40-horse power boiler taken as an example:

STYLE OF BOILERS.	Number of boilers.	Length in feet.	Diameter in inches.	Economical result. Pounds of water to 1 of coal.
Locomotive boiler	1	22	42	8
Return tubular boiler	1	16	43	7
Flue boiler	1	40	45	6
Plain cylinder boiler	2	40	36	5
Gerner Stationary boiler.	1	22	36x48	10
" Portable boiler	1	13	56	11

The question of horse power is a very important one to purchasers. The only true test of a boiler is the amount of water it will evaporate per hour into perfectly dry steam. Taking the average of steam engines, as now constructed, it may be fairly stated that the conversion of from 30 to 35 lbs. of water per hour into dry steam, under a pressure of 50 lbs., is a liberal standard for a horse power. The Gerner boilers are built upon that standard, and are guaranteed to produce that result.

The business management of this boiler is now controlled by Kasson & Co., 119 Broadway, New York (P. O. Box 5,195), from whom full descriptive circulars and price list may be obtained on application.

PROF. HUXLEY AS PRESIDENT OF THE BRITISH ASSOCIATION.

There is, perhaps, no one in England, says the *Spectator* (London), outside the domain of politics, with whom we have contended so often or so fiercely as with Prof. Huxley. We usually disagree with his conclusions, always distrust his method, and occasionally, though rarely, cross-examine his testimony as to facts. Nevertheless, we cordially congratulate the British Association on the successful effort to elect him as President for 1870. It is quite clear, even from the reticent accounts which have appeared in the papers, that there was a contest about his election, and a contest in which it was of the last importance to the cause of free inquiry, or rather of scientific inquiry, of any kind, that his friends should be successful. A battle, it is pretty evident, was fought around him, between the obscurantists and the seekers after truth for its own sake, and if the former had won, as it appeared at one time probable they would win, the cause of truth—that is, in our judgment, of supernaturalism as opposed to materialism—would have been thrown back half a century. The fight, as we understand it, was in this wise. Prof. Huxley, as is well known, holds opinions—no, that is an incorrect description—avows a belief, that the processes of scientific inquiry, if strictly pursued, will yield results not consistent with certainty as to the existence of a sentient Final Cause. The Final Cause may be non-sentient, or may not exist—cause being as infinite as effect—or may be—and this is, as we understand him, Mr. Huxley's preferential view—so absolutely beyond human ken, so clearly the Unknowable, that to attempt to trace its character, or wishes, or end in the government of the universe is an attempt to resolve a recurring decimal, a useless and perplexing waste of time. The idea is one very familiar to the scientific world, and would not worry it in the least; but Mr. Huxley is, unfortunately, very "indiscreet,"—thinks it is duty not only to hold his opinions, but to propagate them; is apt to propagate them very forcibly; and, worst of all, is inclined, when propagating them, to talk English. Nobody competent to form an opinion at all can doubt for one moment that Mr. Huxley intends to say that the existence, and, still more, the character, of the Final Cause is an open question, upon which no human being, the Archbishop of Canterbury included, has any right to give an absolute opinion. Consequently, a large section of the association, like a still larger section of the British public, think Mr. Huxley "indiscreet," or dangerous, and though not prepared to affirm that his opinions are disqualifications for scientific office—to affirm that would be to give up investigation altogether—are prepared to say, that "in the existing state of public opinion," and—ah! hum!—"having regard to the prejudices of the mass of English society," it would be expedient to nominate some president less liable to attack. So strong was the opposition upon this ground alone, for nobody questions the Professor's scientific rank, that the council who had nominated Mr. Huxley appear to have given way, and to have informally requested Lord Stanley to accept the Presidency for 1870. A more ignoble piece of Philistine hypocrisy we never remember to have heard of. We must not, of course, with the "Faithfull *vs.* Grant," in our recollection, assert that Lord Stanley agrees with Mr. Huxley, much more than with his opponents; but we may, at least, say that those who invited him knew that he was not "orthodox," knew that he had described Christianity, in the House of Commons, as "the opinion of Europe," knew that he was certain, from the texture of his mind, to push inquiry to any conceivable length. But because they also knew that he would be discreet, that he would say nothing that could "offend" people who did not understand him, that he would hold an esotoric as well as an exoteric creed, that he would, whatever his conclusion, express it in conventional phrase, they resolved to invite him to take the chair of an association whose single object is the diffusion of absolute truth. Lord Stanley, perhaps aware of the reasons for his own nomination—he generally *is* aware of things, despite his talent for silence—perhaps faintly contemptuous or a preference, shown as much to his rank as himself, quietly declined the honor, advising the association to select a man of science instead of a politician. Thereupon, the council fell back upon their original choice, Prof. Huxley, but even in nominating him, their spokesman, Sir Stafford Northcote, felt it necessary to apologize, and separate himself, in the most marked manner, from his own vote, while the *Times* reports and justifies the sort of dismay with which the election is regarded. Its reporter says: "There seems to be a very general feeling, that Prof. Huxley, in the chair of the British Association, will be in as difficult a position as Mr. Bright in the Ministry. He is the champion of views to which large classes of people entertain very strong objections; and however discreet he may be in the absence of opposition, his best friends tremble for him if those views should be impugned. The great object of the British Association is to render science popular, and this object is best promoted by a President whose name is not identified with one side of an unsettled question, and whose declared opinions are not calculated to provoke any kind of antagonism. About the great scientific claims of Prof. Huxley there can be no dispute; and, while we cannot look forward to his presidency quite without misgivings, we none the less cordially hope that it may fulfill all the expectations of his supporters."

The *Times* exactly represents, in this instance, the idea of the majority of Englishmen, and we cannot conceive of any idea at once more unwise and more ignoble. All through England, as through all the Continent, the one grand controversy raging among cultivated men—whose opinion, be it remembered, will be, ten years hence, the opinion of the people—is, whether the Supernatural exists at all; whether everything is not cause and effect; whether the theory of a Sentient First Cause, which is the basis of all we call faith or religion—though it is not the sole possible basis of morals, the dogma that truth is good, falsehood bad, being, for example, as independent of God as it is of man—is not a delusion out of accord with all the facts, which, if human reason is to be accepted as a guide at all—as a guide, that is, which we can trust as we trust our senses—must be accepted as true. A new and sovereign desire to get at the bottom of this, as the only real question, to have certainty about it, to believe or disbelieve it hard, to frame life on it, is manifesting itself in every stratum of society, manifesting itself very often in a sort of blind fury of enthusiasm. At the same moment, and among the same classes, an equally intense desire is displayed to examine the question through science, through close observation and rigid analysis, and unhesitating recombination of the facts revealed by "Nature," to try the whole subject once for all by the scientific test. So strong is this desire, that it pervades those who know nothing of science, till they fancy that if they had but the talisman it would bring water out of the rock, till we see before us a phenomenon absolutely novel, a confidence without reason, leading to an unbelief as absolute as the belief which a similar confidence in religion formerly produced, a positive faith in faithlessness. We ask any one who knows English society at all if we exaggerate when we say that there are hundreds of able men in England, who, knowing nothing of science, disbelieve in God, or, rather, in God's government, because, as they think, science has dispelled that ancient delusion, who refer honestly and confidingly to the "authority" of science exactly as men once referred, and, on the Continent, women still refer, to the "authority" of the Church, who regard Profs. Huxley, Tyndall, and the rest, as "directors" are supposed to be regarded by faithful Ultramontanes. It is in the midst of all this, of a controversy which we can say, as heartily as the *Record* or the *Tablet*, affects "salvation," which, that is, must perceptibly affect the relation of man to God, for generations, that Sir Stafford Northcote and the *Times*, and the thousands who feel with them, advise that the conflict shall become "discreet," that no man, very prominent on either side shall be raised to the chair in the recognized committee of investigation; that the leader of the naturalists shall be silenced so far as may be, that all reports on the progress of inquiry shall evade the main issues; that, in short, everybody shall go on telling decorous little lies till everybody else is dead. We cannot, they say, trust the discretion of Mr. Huxley, if opposed. Discretion! Do they, then, want Mr. Huxley's opinions to prevail? It looks very like it, but we are aware that numbers who do not want it are of the same way of thinking, and we will just tell them what their demand for "discretion" means. It means that the discussion shall go on as fiercely as ever, but in a new and occult language, that a skepticism irresistible, because released from the necessity of defense, shall spread throughout society, shall grow with every year, and every discovery, and every new claim of unopposed "authority," more and more unsparing; shall saturate the young, and paralyze the middle-aged, and shock the old, until at last it breaks out, as every protest against repression breaks out, in a flame of fury, which, for a time, will burn up faith through Britain, as it is burning it up wherever Ultramontanism has power to do what these "discreet" men of science desire to see done here. It means that a caste is to grow up whom the multitude cannot help respecting on account of their knowledge, and who are to transmit through ages an occult faith which all who are ambitious, or inquisitive, or devoted to truth, will seek to know, which they will learn as a mystery, amid all the attractions mystery lends to every science, and which, when they have learned it, will teach them that faith is folly, religion a delusion, its teachers obscurantists, and

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the only truth—the truth that truth is undiscoverable. It means that the defenders of supernaturalism, or, as we contend, of true science, shall be paralyzed; that they who can fight only in the light,shall be forced to a combat in the dusk; that they shall have no arms, while their adversaries are invested with the enchanted weapons of the ancient creeds,with the shield of darkness, and the sword of the love of truth, and the jointless armor of an impenetrable faith. It means that we who fight for the existence of the supernatural as a as a scientific fact as capable of demonstration as the fusibility of metals, are never to be permitted to see our enemies; indeed, are never to have any enemies, but to be placed like soldiers in a marsh to shoot arrows against a blight, to disperse miasma with artillery, to make shade brightness with the bayonet, to secure the impossible through conditions which are self-contradictory. We are to avoid all that is not orthodox, to say nothing straight out, to leave the defense, say, of a possible divine destiny in man to the Archdeacon, who says such a destiny must be, because it is clear that the angel who waved the sword at the gate of Eden must have been created after man, and being created after man, proves that man was a creation,and not a development,and thinks rubbish of that sort will stop the progress of infidelity. But, says the *Times*—it is not merely a reporter who says it,though the words appear in a report, for the *Times* does not allow its reporters to lecture in that style—Mr. Huxley is so indiscreet. So much the better, both for truth and for orthodoxy. If there is one thing dangerous to the faith of a people, it is that disbelief should be hinted, should be veiled under sarcastic compliments to faith,should become the secret of the initiated, the *arriere pensee* of the cultivated, should filter down from mind to mind in silence, should drop through,as it were, from the supper table to the basement, and nobody be conscious that it is dropping, till accident reveals the irremediable mischief. That is how Voltarianism was diffused, and that is how English secularism will be, if the able respectables like Sir Stafford Northcote continue so dreadfully afraid of indiscretion in discussion. Discretion, in this case, is simply concealment of the very thing that ought to be known, namely, the gravity of the moral result involved in the scientific inquiry—a gravity which, once realized, makes that inquiry not only much more exact, but much wider. Take, for instance, this discussion about primeval man. It does not really involve any religious point of importance—for, after all, whether man had a lemur for his ancestor or not, he is still man—but it is supposed to do so, and look how that supposition instantly widens the inquiry. Lawrence went into it as if all the data were bones and muscles, Sir John Lubbock includes the history of civilization, Mr. Wallace adds a vast mass of facts as to the moral instincts of savages, till at last, man being fairly treated, as a whole, all the facts being examined under the new pressure, Hr. Huxley, who is so much dreaded, makes what seems to us the greatest conceivable concession to the supernaturalists—that the chasm between man and the brute is beyond measurement—is infinite. There is no point of view except one, from which the reticence now advocated can be logically defended. Of course, the unbeliever is not shocked. Suppose the observer is orthodox, then surely a frank statement that certain appearances seem inconsistent with the being of a God, is a warning not to accept those statements without the inquiry, rendered needful by that tremendous result, is infinitely better than a mere hint apparent only to the initiated, that if it were safe to speak, that is what would be said. For the interests of the orthodox such a conclusion should be stated in its clearest and least discreet form, not in its least "offensive." Nobody is really injured by plainness except that class represented by the *Times'* reporter, which holds, that next to enthusiasm, the one great evil is disturbance; that nothing is worth a fuss; that indifference is the proper state of mind, even if the subject of indifference is the existence of a Creator. This is the true English middle-class state of mind,and the more it is shocked, annoyed,and horrified by indiscretions like Mr.Huxley's,on one hand,and Mr. Stokes' on the other, the sooner will it begin to find a reason for the faith that is in it. If we only had an "indiscreet" Archbishop!—but that being impossible, let us be thankful that we shall next year have an indiscreet President of the British Association.

IRON FOUNDING---UNITING CAST IRON BY "BURNING-ON."

From the "Practical Mechanic's Journal."

Conecting lead with lead, by running a stream of very hot liquid lead, suitably confined, in contact with a surface of solid and cold lead, until the latter had got to its melting point, and then stopping the current, so that the two portions become united when both are solid, has been known to plumbers for ages under the name of "burning together." In fact, by this method some of the earliest lead water pipes were made before drawn pipe was known.

This same method of "burning together" may be also employed by the iron founder, and occasionally with great advantage. The writer, in the course of his early practice, had occasion to cast four of the very ponderous columnar cast-iron frames which, in the earlier days of steam navigation, were to be employed for the side frames of side-lever marine engines of the heaviest class. The frames in question consisted of coupled Roman-Doric columns of considerable diameter, cored out, with cross framing and entablatures, also all cored out, and with sundry projecting pieces like truncated horns. etc., whereby the frames were to be united with other "thwartship" pieces, each frame weighing several tuns and consuming a large amount of wages in molding.

All four were cast sound and without a blemish, except that, upon the top box in which one of these was cast—all being cast in green sand—some one had unluckily dropped a bar or something heavy, or put a foot upon it, and produced "a crush," which rendered one of these horns utterly amorphous. The casting, otherwise perfect, was in that state absolutely useless, and was about to be broken up, when the writer resolved to try and save it by attempting to "burn on" a new and perfect horn. The old and defective mass was carefully cut off, and removed down to absolutely sound metal. "Loam cakes," having the proper form for the horn,were taken from the pattern,the surface of the cut metal was well dusted over with powdered glass of borax, after that the mass of the "frame," in close propinquity with the defective place, had been heated red hot in a coke fire built up around it. The fire was then raked away, the loam cakes secured in place, and several hundred weights of very hot liquid cast iron were for some time kept flowing through the cavity of the loam cake hollow mold. At length the flow was stopped, when the cut surface could be felt, with the point of an iron bar pushed through the running metal, to have become pasty and soft, and the iron was then permitted to set. When finally stripped and "gates" etc., removed, the new horn was found to be perfectly united with the remainder of the casting, and when struck it gave the clear sonorous ring which proves complete metallic continuity.

The success, in fact, was perfect, and somewhat surprised both the writer, to whom so large an instance was new, and the marine engineer responsible for the supervision of the work, who would not pass the casting until he had assured himself of the safety of the horn by striking it heavily with a sledge hammer. This method is capable of being applied not unfrequently with similar ends in view, and may often save the condemnation of a casting and effect a good deal of economy. It can almost always be made effective, if the methods be judicious, for attaching, as in the above case, a heavy piece to a heavy casting; but it is a far more delicate and difficult task to make it succeed with smaller and more delicate work, and there are two generic cases in which it is useless to attempt it.

One of these is where the form or dimensions, or both, of the casting must remain precisely the same after the work as before; as, for example, if a piece be defective in the rim or in one of the arms of a large spur or head gear wheel, there would be no great difficulty in replacing it soundly by casting together as described; but either the wheel would crack somewhere on the setting of the "burnt-in" metal, or during its cooling, or it would have lost its circular form and "truth" when all should be cold.

Again, if the mass of casting be very great, and it is but a hole or cavity, regular or not, that requires to be filled in with metal, which must be perfectly united with the remainder, this can scarcely be accomplished unless at an expense that renders the process worthless; for the whole huge mass must be brought to a strong red heat, with great expenditure of fuel and time and surface injury to it by oxidation, or the union will prove imperfect. Such has been the fate which has always attended attempts thus to restore defectively cast cylinders for hydraulic presses. The writer,however,has little doubt but that a sort of small coke-fed furnace, with a strong blast, delivering from a small brick-lined mouth a jet of flame like like that of a large blow pipe, might be so used as to heat even up to the melting point—and but very locally or partially—any mass of cast iron however huge, so as to admit of "burning on" to it. He once witnessed sufficient proof of this in the method taken to repair a defect which appeared in the neck of a very heavy cranked intermediate shaft for marine engines, at the Thames Iron Works, just before Mr. Mare ceased to direct them. The neck of the crank about eighteen inches in diameter, was rough turned, when a hole was found and cut into in the forging, close to the angle of the neck where joining with the arm or side of the cranked part. Nothing could be more awkward as to position, and the condemnation of the whole forging, and serious loss, seemed imminent. The foreman blacksmith determined upon one trial to save it. He got up just such a coke-fed giant blowpipe as has been described, and drove its flame right into the defect or cavity, having carefully "clayed up" the iron of the rest of the crank adjacent, to save it from oxidation.

In about five hours he had the interior of the cavity at a fine uniform and clear welding heat. A piece of wrought iron, well judged—as to form—to rather more than fill it, had been got ready, and at the right moment was brought, in a forge fire, to a welding heat also; and the blowpipe blast being thrown off, the welding hot plug, preceded by a dust of sand and borax glass, was thrust against the cavity, and a single blow of a "tup," beforehand properly swung ready, sufficed to firmly weld it into place. The superfluity, when cold, was chipped off, and the turning of the neck completed, which the writer witnessed; and he can testify that it was not possible upon the clean cut surface then to discern where was the new iron, and where the surrounding old of the original forging. The work reflected much credit upon the skill of those who conducted it, and in that respect alone deserves to be recorded. The method of heating, however, is quite as applicable to cast as to wrought iron.

The marine-engine framing above referred to was treated about 1833. In the "Annales des Mines" for 1860, M. Mengy gives a circumstantial account of the same method having been applied about the same date at the Tamaris Iron Works, Department of Alais, to "burning on" the broken-off necks of the iron rolls of the rolling mill, and with complete success. Dr. Percy ("Metallurgy," p. 745) states that he has seen a roll thus repaired at the Millwall Iron Works, and that the method has been in occasional use elsewhere.

THE State fairs in progress throughout the country have generally been very successful. Thirty thousand people visited the fair grounds at Elmira in one day

Home-Made Ladders.

In making ladders, says the *American Agriculturist*, we prefer to use red cedar for the poles, and oak for the rounds. White cedar will answer well, and so will white pine or spruce for poles, and the rounds may be made of many different woods. Dogwood is good, cutting stems of the right size, and the bark may be left on. Hickory does well, if the ladder be kept painted, and not exposed to the weather—otherwise it rots at the ends where inserted in the poles. Cut a straight cedar pole of at least six or eight inches in diameter at the butt, and of the desired length, if such a one can be found. Lay up to season six months or a year, and take care that in drying it does not get a bend. With a little painstaking it may be improved in straightness while seasoning, if not straight. Then shave off the bark and branches with a drawing-knife; cut it of the right length; plane down a strip ot three inches wide on opposite sides, and mark it and saw it in two in the middle lengthways. If well done, we shall have two long, straight, sound, tough, stiff poles. Mark off the points for holes for the rounds alike in each; fourteen inches is a good distance to have the rounds apart. If the ladder is to be a wide one, the lower rounds should be an inch and a quarter in diameter, and the holes an inch, while the upper rounds need not be more than an inch in diameter. For a ladder fourteen inches between the poles, inch rounds are large enough for the bottom ones, and five eighths inch for the top.

Split and shaved rounds are as good as turned ones, unless one is making a very nice job, when the rounds may be split out and then turned. It is well to make the rounds with a slight shoulder, so that the poles cannot be driven together at all by a fall. This is apt to split them, and if the rounds are simply shaved down to enter the holes, it is imperatively necessary to insert several flat rounds two or two and a half inches wide and three quarters of an inch thick, having tenons at the end, with strong shoulders, and fitting into mortices. When the ladder is put together, dip the ends of the rounds in paint; set all the rounds in one pole first, then put on the other; and, finally, after sawing off the ends of the rounds, drive hard-wood wedges into each alternate round, so as to spread the ends and prevent their drawing out. Wedge the flat ones particularly. With a plane, a drawing knife, and a little sandpaper, the ladder is easily finished, and a good coat of varnish will make it last a long time as good as new.

The Volcanoes of Cotopaxi and Chimborazo.

In January, 1802, Humboldt and his friend Bonpland, reached Quito, and attempted the ascent of the grandest peaks of the Cordilleras but they were defeated by the difficulties of the enterprise. In the eruption of 1739, Cotopaxi vomited red-hot stones 3,000 feet above the crater, and its roaring was heard at a distance of two hundred miles. It is the most terrible volcano in the whole range; its form is a perfect cone, crowned with snow, and its appearance is eminently grand and beautiful. In the attempted ascent of Chimborazo, the explorers were accompanied by a young Spaniard. They started from the south west side, traversing great plains, which rose one above the other, like terraces, until they reached that of Sisgun, 12,400 feet above the level of the sea. They continued to ascend until they reached Yava-Cocha, a circular lake, the highest spot yet reached by other travelers. Here they left their mules, and crossing a plain of tawny grass, they came to a region where the rocks rose in columns, like an enchanted forest of stone. Passing over this district, they arrived at a place where the path became too steep and the snow too dangerous to venture on. All the guides except one refused to proceed any further, and he led them by a route which he called a "knife-blade," sometimes on hands and knees, and always with their poles testing the way before them. For another hour, through increasing mist, they persevered; the barometer showed them an altitude of 18,380 feet; and here they began to suffer from the rarefaction of the air. They breathed with difficulty, their heads swam, and their eyes became suffused with blood. Condors came sweeping down the terrible pass. Once the mists parted, and they beheld the vast dome so near to them that they believed they should certainly reach the summit. They hurried on, but all at once their further progress was stopped by a vast chasm four hundred feet deep and sixty feet wide. They had attained a hight of 19,200 feet. They descended the mountain in a storm of hail and snow.

In another excursion they crossed a bridge one hundred and twenty feet long, formed of ropes, manufactured from the fibrous roots of the Aguava Americana, three or four inches in diameter. It was by a bridge of this kind that a permanent communication was kept open between Lima and Quito. On their way to Cotopaxi they saw the house of the Inca Huayna-Capac. It formed a square of one hundred feet with walls of burnt porphyry, three feet thick, and the stones as regularly wrought as in Roman buildings. The doors were similar to those of the ancient Egyptian temples.

Is the Fifth Avenue Pavement a Failure?

We recently stated, in the SCIENTIFIC AMERICAN, that a covering of asphalt and gravel was in process of being laid over the pavement on the Fifth Avenue. The work is now completed, and it is certainly a great relief from noise to the residents of the avenue, and a luxury to those who ride over it; but we fear that the result will prove unsatisfactory, as already there are many visible signs of injury to the surface. It is still our belief, and we so expressed it to the person in charge of the work, that vehicles were allowed to run over the covering before it had become sufficiently seasoned. The result, we fear, is likely to prove that the experiment, so far as Fifth Avenue is concerned, is a failure.

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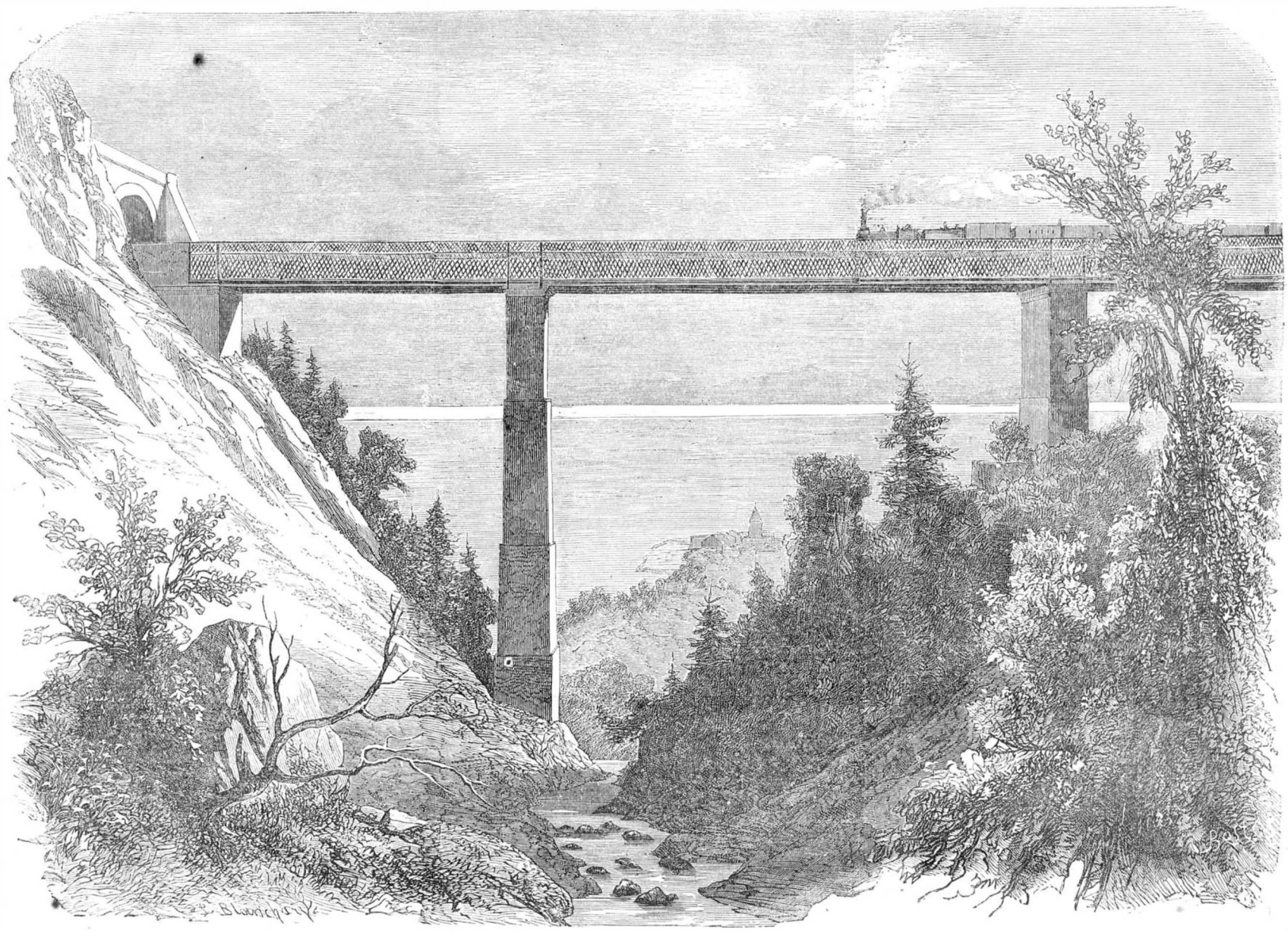
CHATELARD VIADUCT OF THE LAUSANNE AND FRIBURG RAILROAD.

The line of railroad that unites the two cities of Lausanne and Friburg is one of the most picturesque in Switzerland. One portion of the line on leaving Lausanne rises rapidly on the Vaudois slope of Lake Leman, the waters of which wash the base of gigantic rocks of Savoy and Valais. A sharp curved tunnel suddenly hides this magnificent panorama, perhaps the most unique in Europe, and the traveler is speedily transported into the midst of a display of vigorous nature, hills covered with trees, and fertile valleys.



LAUSANNE AND FRIBURG RAILROAD VIADUCT.

The ancient city of Friburg is one of the most wild and picturesque in Switzerland. It stands partly in a small plain, partly on bold acclivities, on a ridge of rugged rocks, half encircled by the river Sarine, and is so entirely concealed by the surrounding hills that the traveler scarcely catches the smallest glimpse, until he bursts upon a view of the city from the overhanging eminence. There are two fine suspension bridges across the river, one of which hangs 284 feet above the bed. A short distance out of the town is the celebrated railway, Grundfy viaduct, constructed of iron. Indeed the difficulties to be overborne on that line, were very great, and in order to effect a passage over the abrupt ravines, recourse had to be made to works of art, the dimensions of which fill the traveler with feelings of wonder: such are the viaduct of Pandese, constructed of masonry, and the sheet iron viaduct of Chatelard an illustration of which is given herewith, constructed by Ladet and Alphaise of Paris.

Manufacture of Tigers in India.

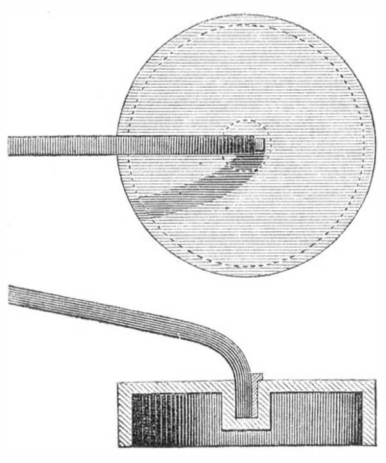
A cotemporary writes as follows: "Sportsmen and taxidermists have much to learn in India. To keep down wild beasts a somewhat liberal scale of rewards are offered for every slain tiger, leopard, and bear. Asiatic ingenuity has so defrauded the authorities for a long time that the Bengal Board of Revenue has issued a grave order describing the acts by which districts officers are deceived: 'When a tiger, leopard, or bear has been killed, the skin is split in two. The upper skin, with the hair on, is removed; a manufactured skull is fitted to it, and it is presented with a claim for reward. The real skull of the animal, with some flesh on it, and a complete under skin, but without any hair, is likewise presented as that of an altogether separate animal, both specimens being fresh. The fraud is often successful. In other cases an entire skull is manufactured out of broken bones joined with strong twine. To the bones a filthy compound of putrid flesh, with coloring matter for blood, is glued on, and then covered with skin, slit at the places where the mouth, nose, and ears should have been. When a sufficient supply of tiger skins and skulls is not procurable, skulls of ackals and dogs are often substituted, with tiger's teeth fastened in front with glue, the whole being covered over with pig-skin molded over a genuine tiger's skull.'"

Mineral Lemonade.

When equal parts by weight of strong pure sulphuric acid and strong pure alcohol (85 to 90 per cent) are carefully mixed (the acid being poured into the alcohol and thoroughly mixed therewith), a liquid is obtained which has long been known and used by medical men under the older name of *Elixir acidum halleri*, more recently named *Mixtura sulphurica acida*. This fluid, which, if well prepared, contains essentially sulphovinic acid, is an excellent summer beverage when mixed with water in the proportion of one small teaspoonful to a tumbler of cold water, sweetened with sugar, or, preferably, with some fruit sirup. Above the lemonades made with vegetable acids, this acid mixture has the advantage of not increasing the perspiration, as citric and other vegetable acids do, while it is better borne by the stomach, and has a tonic action upon the vascular system. It is, indeed, a very pleasant drink, often given at the *cafés* of Paris, Berlin, Vienna, and other places, along with some *syrop de groiselles* or *framboises*, and rather exorbitantly charged for. The proportions by bulk are—one of strong sulphuric acid and three of alcohol.—*Hamm's Zeitung.*

JAMES HENDERSON'S IMPROVEMENT IN THE MANUFACTURE OF IRON AND STEEL.

This improvement is designed to enable persons having the old style of iron works with puddling furnaces to compete



successfully with the new processes. It consists in applying in a bath of melted cast iron a box or vessel with one open side preferably at the bottom, and composed of any suitable substance, such as cast iron, green wood, or fire clay, in which are placed such substances as are desired to act upon the bath of molten iron in the furnace; this has been found to be a very effective and economical manner of imparting to the bath of iron such properties as are desired to be given to it, and also to remove sulphur, phosphorus, carbon, silica and other impurities from the iron and the oxides in the furnace, and producing a greater yield of iron, and saving about one-third of the time and fuel consumed in puddling, and by means of the alloys used in connection with the fluxing agents, such as nitrates evolving oxygen and forming a flux, at the same time steel of any desired grade or strength.

The *rationale* of this process is, that the substances being applied at the bottom of the bath of cast iron from a vessel open at the bottom must necessarily ascend from the bottom and sides of the vessel when they are melted or set free by the heat of the furnace and such substances as nitrates being used which evolve oxygen also form very effective fluxes by reason of their salts combining with the silica, magnesia, and alumnia, in the iron and oxides covering the bath and lining the furnace, the iron and oxides are thus purified by the action of the gases and salts and alloyed with the proper quantities of the substances introduced into the bath for the purpose by means of the box or vessel; the operation is thus two-fold, the alloying takes place at the same time that the refining or purifying action is performed.

By this process it is possible to obtain from the most inferior grades of pig iron an article of steel having all the welding properties of iron and of uniform quality, and of the tensile strength of 180,000 lbs. to the square inch.

The annexed sketch represents the box with handle attached for convenience of the workmen in moving it about the furnace.

When thus applying two to three per cent of nitrates to the weight of the cast iron in a puddling furnace that was "fixed" with iron ore, a gain of ten per cent of puddled bars was obtained over the weight of the pig iron charged in the furnace, whilst the time of the labor in puddling was shortened fully one third; there was consequently a saving to this extent in labor, time, and fuel.

Wm. Fairbairn, Esq., the eminent English engineer, has recently reported to a scientific association, that nitrate steel, produced from the most inferior grades of pig iron, that of Northamptonshire, England, is superior in quality to the pneumatic process steel made from the best Lancashire pure steel irons.

This process is cheaper than the English nitrate process referred to, or any other process of making iron or steel, and produces more uniform results than any, and of the best quality.

Nitrate of soda is formed in Peru in inexhaustible quantities; the tract of territory covered by it is 120 miles long and several feet deep, and it can be delivered in English or American ports at about £8 10s., per tun or $42 in gold or about two cents per pound, the price here now is quoted at four and a half cents (gold), this is owing to the scarcity at present existing, caused by the derangements of operations in Peru by earthquakes last year.

Patented Aug. 17, 1869, by James Henderson. Further information may be had by addressing Player and Henderson, 30 Broadway, New York

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Improvement in Flooring Clamps.

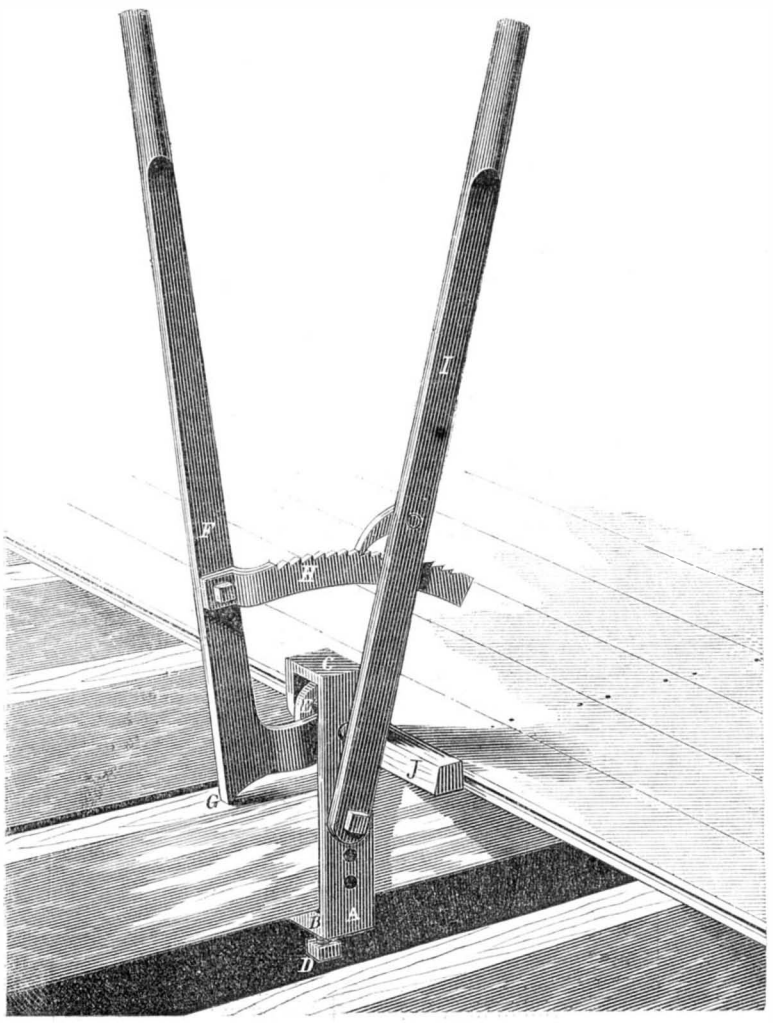
A want has long been felt in laying floors for some device, that could be quickly applied to press the boards together before nailing. The improvement shown in our engraving has been used, and is claimed to answer all the purposes required.

A represents the stock of the clamp, having two right-angled brackets, B and C, which are in use placed over and under the joists. The lower bracket is provided with a set-screw or stud, D, which is designed to bite into the wood to prevent slipping. The upper bracket supports a hinged tongue, E, which may be raised to permit the application of said stock to joists, and swings down again to prevent the stock from falling laterally. Near the top of said stock a cranked lever, F, is pivoted to A, having a sharp heel, G, which, when in use, bites into the top of the joists, to prevent slipping. It is also provided with a segmental rack, H, to hold what is gained by the clamping lever, I, which is provided with a pawl to catch into the rack, H; but the clamp may also be used without the rack.

In operation a clamping block, J, is laid on the joists in front of the board to be clamped, and nailed. The tongue or guard, E, is then raised, and the stock or clamp, A, is placed on the joist in front of said block, letting the tongue, E, swing down. By pulling the levers apart the flooring is effectually clamped.

The lever, F, forces the set-screw or stud, D, into the bottom of the joist, and by the same motion the sharp heel of F is inserted above, thus giving a sure hold to the clamping lever, I.

The inventor claims that this implement will pay its cost in saving of time and labor in a single fortnight. Patented through the Scientific American Agency, Aug. 3, 1869. For further information or for State rights apply to the inventor, David Nevin, Boulder City, Colorado.



NEVIN'S PATENT FLOORING CLAMP.

THE CANADIAN PATENT SYSTEM.

The Ottawa *Times*, in replying to some strictures applied to the recent so-called amendment to the Canadian patent laws, feels compelled to put in a sort of quasi apology. It says:

"The central idea of the commercial policy of England at the present day is free trade; the commercial and manufacturing interests, of which the last are most directly influenced by patent rights and their regulation at home and abroad, will not brook any legislative action interfering with their pet theories, and where they believe that they can bring any pressure on outside communities, as upon these Colonies, by means of Imperial remonstrances they never hesitate to exercise it to the utmost. But in a new country such as ours, where our natural resources are undeveloped, our population sparse and scattered, except in a few large cities, and our manufactures wanting in the large capital necessary to give that stability which they possess in the Mother Country, our policy must be to a certain extent protective, to give any degree of strength to our infant resources, and it is as great folly to complain of that system, as it would be to expect us to adopt in a day the land system, or any of those other peculiar forms of English social or commercial life, which have been the growth of centuries of increasing wealth among a dense and skillful population.

"The new patent law has been complained of for the illiberality of its enactments, but even a casual glance at its provisions will enable any one to see that the residence of one year, which is made compulsory for taking out a patent, is calculated to give more privileges to the foreign inventor than the old system under which patents might be 'introduced' into Canada, without any protection for the original patentee."

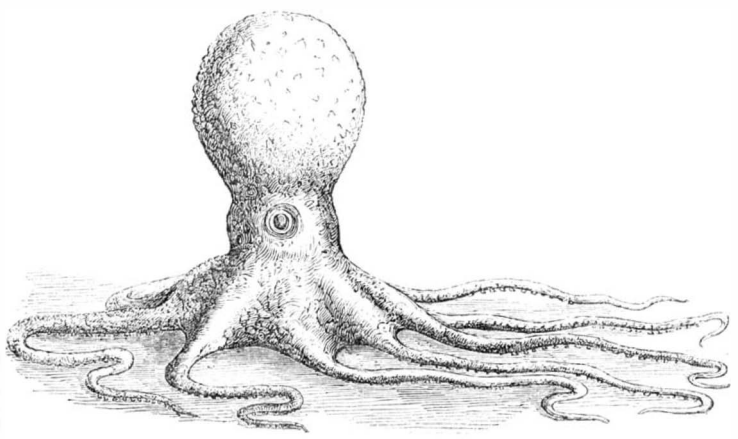
Very true. We admit that the new law is somewhat better than the old one, but why insist that a non-resident inventor shall come into your Dominion, and there reside for one year before he can be allowed to take out a patent for his own invention? Canada, we admit, is a pleasant country to visit at certain seasons of the year; but, independent of the cost of a year's board at some boarding house or hotel, we cannot see what other fair advantages are to be gained by this system.

The truth is that the people of Canada want to get hold of all the valuable inventions made by others and use them without compensation. This is neither fair nor honest.

THE OCTOPOD, OR BRAZILIAN CUTTLE FISH.

BY LUCIE L. HARTT.

It was during my first visit to Brazil, that one day, while busily engaged in examining a reef at a little town on the coast called Guarapary, my eye fell on an object in a shallow tide-pool, packed away in the crevice of the reef, which excited my curiosity. I could see nothing but a pair of very bright eyes; but, concluding that the eyes had an owner, I determined very rashly to secure him. I had been handling corals and seemed to have forgotten that all the inhabitants of the sea were not harmless. I put my hand down very quietly so as not to ruffle the water, when, suddenly, to my surprise, it was seized with a pressure far too ardent to be agreeable, and I was held fast. I tugged hard to get away, but this uncivil individual, whoever he was, evidently had as strong a hold on the rocks as he had on my hand, and was not easily to be persuaded to let go of either. At last, however, he became convinced that he must choose between us, and so let go his hold upon the rocks, and I found clinging to my right hand, by his long arms, a large octopod cuttle fish, resembling the one illustrated in this article, and I began to suspect that I had caught a Tartar. His long arms were wound around my hand, and these arms, by the way, were covered with rows of suckers, somewhat like those with which boys lift stones, and escape from them was almost impossible. I knew that this fellow's sucking propensities were not his worst ones, for these cuttle fishes are furnished with sharp jaws, and they know how to use them too, so I attempted to get rid of him. But the rascal, disengaging one slimy arm, wound it about my left hand also, and I was a helpless prisoner. In vain I struggled to free myself—he only clasped me the tighter. In vain I shouted to my companion—he had wandered out of hearing. I was momentarily expecting to be bitten, when the "bicho" suddenly changed his mind. I was never able to discover whether he was smitten with remorse and retired with amiable intentions, or whether he only yielded to the force of circumstances. At any rate he suddenly relinquished his hold upon my hands and dropped to the sand. Then raising himself on his long limsy arms, he stalked away towards the water, making such a comical figure, that in spite of my fright I indulged in a hearty laugh. He looked like a huge and a very tipsy spider, staggering away on his exceedingly long legs.



The cuttle fish belongs to the Mollusks, a branch of the animal kingdom distinguished for its members being built on the plan of a sac, and to which Mr. Hyatt has applied the more appropriate name of *Saccata*. The cuttle fishes are distinguished from all the other Mollusks, such as snails, clams, etc., by having a large head, a pair of large eyes, and a mouth furnished with a pair of jaws, around which are arranged in a circle, eight or ten arms furnished with suckers.

In the common cuttle fish or squid of our coast, the body, which is long and narrow, is wrapped in a muscular cloak or mantel, like a bag fitting tightly to the back but loose in front. It is closed up to the neck, where it is open like a loosely-fitting overcoat buttoned up to the throat. Attached to its throat, by the middle, is a short tube open at both ends. This tube, or siphon as it is called, is fastened to its throat, and can be moved about in any direction.

The animal breathes by means of gills, which are attached to the front of the body inside the cloak and look like the ruffles of a shirt bosom. By means of these gills the air contained in the water is breathed, and they answer the same purpose for the cuttle fish that our lungs do for us.

In order to swim, the animal swells out the cloak in front so that the water flows in between it and the body. Then it closes the cloak tightly about the neck so that the only way the water can get out is through the siphon. Then it contracts very forcibly its coat, which, it must be remembered, is a part of the animal, and the water is driven out in a jet from the siphon under the throat, and the body is propelled in the opposite direction; that is, backward like a rocket through the water. This siphon is flexible like a water hose, and can be bent so as to direct the stream not only forward, but sidewise and backward, so that the animal can move in almost any direction, or turn somersets with perfect ease, and so rapidly do some cuttle fishes swim that they are able to make long leaps out of the water. Uusually, however, the animal swims backward, with its long arms trailing behind. Our common cuttle fish of this coast has, in addition to its eight arms, two long slender tentacles which may be withdrawn into the body. The tail is pointed and furnished with a fin on each side.

The Octopods, to which the Brazilian cuttle fish belongs, have round purse-like bodies, and eight arms united at the base with a web, and they swim by opening and shutting their arms like an umbrella; in this mode of swimming they resemble the jelly fishes.

The paper Nautilus is nothing in the world but a female cuttle fish that builds a shell. There was a very pretty story told of her habits, by Aristotle, the old Greek naturalist, which every one believed until quite recently. He said that she rode on the top of the waves, seated in her boat-like shell, and spread her broad arms to the winds for sails. But unfortunately the story has no foundation in fact. She either crawls about on the bottom of the sea, or swims quite like any other cuttle fish, shell foremost, only occasionally coming to the surface. Strangely enough she holds the two broad hand-like extremities of the arms against her body, and it is the inside of these arms that secrete the paper-like shell, which is only a sort of cradle for her eggs. Not so with the pearly Nautilus, which is furnished with a beautiful, coiled up, pearly shell, formed on the outside of the animal. This shell is divided into numerous chambers, and the animal living in the outer one builds a partition across the back part of it as the shell grows.

Cuttle fishes are sometimes used for food by the Brazilians and different species may be seen in the markets, where one frequently finds them still alive. Sometimes, as he stoops to examine one, its body is frequently suffused with a deep pinkish glow. Before he has time to recover from his surprise this color fades, and a beautiful blue takes its place as rapidly as a blush some times suffuses a delicate cheek. The blue, perhaps, is succeeded by a green, and then the whole body becomes pink again. One can hardly conceive anything more beautiful than this rapid play of colors, which is produced by the successive distention of sets of little sacks containing fluids of different colors, which are situated under the skin.

The cuttle fish is also furnished with a bag containing an inky fluid, which, when the animal is attacked or pursued, it ejects into the water, thus completely blinding its adversary and effectually covering its retreat. It is from this fluid that the color *sepia* is made. Besides carrying an ink-bottle, some species of cuttle fish are provided with a long, delicate, horny pen, which forms a sort of stiffener to the back. In some species the pen is hard, thick, and broad, and the cuttle fish bone of commerce is a pen of this kind. The species found in our waters is very small, and not at all dangerous, being barely large enough to draw blood from the hand; but in the tropical seas they are very large, powerful, and dangerous.

The cuttle fish is the original of Victor Hugo's devil-fish, so vividly described in the "Toilers of the Sea." If the devil fish were a beneficent creation, I should be sorry to destroy your faith in it; but as it is, I believe it will be rather a relief than otherwise to know that in some important respcets, Victor Hugo's story of it is a fable. The Kraken was a mythical cuttle fish of fabulous size.—*American Naturalist.*

Boiler Explosions.---Anti-incrustation Compositions.

At the Manchester (England) Steam Users' Association meeting, held recently, Mr. L. E. Fletcher, chief engineer, referring to one explosion, said the owner of the boiler had adopted a new composition for the prevention of incrustation for six or seven months before the explosion. This composition proved most efficacious for preventing incrustation. It removed the hard cakes adhering to the plates and reduced them to powder; so that when the men entered the boilers for cleaning, instead of finding them coated as before with a tenacious scale requiring hammer and chisel to remove, they found several bucketsful of flour or dust, which was readily washed out. There must evidently have been a large quantity of this fine floury deposit accumulated in the boilers, and floating about in the water when they were at work. The fine floury deposit appears to interfere with that intimate contact between the water and the plates which is necessary to pro-

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vent over-heating, while it may be that, from the thickened water, the globules of steam cannot freely escape, and, thus caged within it, linger longer in contact with the plates over the fire than they should do, and thus form a film between the iron and the water, in consequence of which the heat is not carried off rapidly enough and over-heating ensues. It is not intended by this that they are made red hot, but that they are heated sufficiently to so increase their ductility as to lead to the undue compression and the consequent deflection of the over-heated parts. The explosion is, therefore, attributed to over-heating of the furnace crowns, though when covered with an ample supply of water, consequent on the accumulation within the boiler of a large amount of fine floury deposit, caused by the use of an arsenical composition for preventing incrustation, coupled with the suicidal practice of neglecting to open the blow-out taps. This is the first explosion which has ever occurred to a boiler guaranteed by this association; and it will be impossible, without the hearty co-operation of the members, to prevent such, without imposing restrictions upon them with regard to the treatment of their boilers, which the association has at all times been desirous to avoid. But this opportunity may be taken of strongly urging upon the members the advice which has repeatedly been given personally on previous occasions—that they should not experiment on their boilers with anti-incrustation compositions. They will find it a safe, and, in the majority of instances, a very efficacious plan to feed the boilers with two or three pounds of good soda ash daily; the soda not being introduced in heavy charges through the man-hole at cleansing times, but along with the feed, so that the boilers may be constantly fed with weak soda water; while the blow-out taps, both at the bottom of the boiler and surface of the water, should be regularly used. There is a composition now strongly advocated which acts rather mechanically than chemically, by forming a thin film of varnish upon the plates, and thus preventing the adherence of the scale. With some waters this has its dangers; the film or coat of varnish may protect the plate from the water as well as from the incrustation, and thus lead to overheating, and two cases of injury have lately been met with which have arisen from this cause.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

The Avondale Disaster.

Messrs. Editors:—My suggestion will be too late to help the unfortunate miners at Avondale, but may be of use in some future disaster. The plan I suggest is, to have close by each mine two or more complete diver's suits, with all attachments ready for instant use. To enable the miner to drag the necessary air hose along the levels, he would require a hose carriage similar to that used for the compressed air coal cutters in England. For some points, when the hose would be liable to entanglement, small vessels of compressed air, or compressed oxygen, would enable a man to work for a limited time. Some of the suits should be the ordinary deep-sea dress so that assistance could be carried through drowned parts of a level.

The suits used merely to protect against gas could be made almost as light as an ordinary suit of clothes. By this means a few men could be supplied with air and could get at once to points that now require days to reach in safety.

My suggestion may not be practical in its present shape, but the principle of carrying the limited supply of air to the point when it will give its maximum useful effect in cases of disaster will bear working out by those who are practical miners.

J. G. S.

Philadelphia, Pa.

Marks Produced by Lightning Stroke.

Messrs. Editors:—I notice an article on page 170, current volume of the Scientific American, on the subject of marks produced upon the body by lightning stroke.

I wish to state an instance of the kind which occurred in the upper part, or western portion of Washington county, Md., some time in July, 1851, to which I, with several others, was an eye-witness.

In an open lot near the residence of the late Captain John Ressley, about two and a half miles northwest of the town of Hancock, in the county named, stood an oak tree of medium size, under which, during a thunder storm, a sheep had taken shelter from the rain. On a limb or branch of the tree sat a robin, directly over the sheep; a flash of lightning struck the tree, the robin, and the sheep; killing both of the latter. We saw the sheep lying under the tree and went to see if it had been killed. When we arrived, we found the sheep dead, lying upon the left side, and found the dead body of the robin lying upon the right, or upper side of the sheep. Capt. Ressley, who owned the sheep, ordered his servants to skin the sheep, which they did immediately, and when they came to the spot on the right, and which was the upper side, where the body of the robin had fallen and where we had found it, they noticed a strange appearance, and called our attention to it. To our no small astonishment, we found on the inside of the skin of the sheep and also on the flesh of the body of it, a perfect picture of the robin, even to the fine fringes of the feathers of its wings. Now it could not have been the falling of the body of the robin upon the body of the sheep that caused the impression, as the figure or picture thus formed was not that of a dead bird lying sidewise on the sheep as we found it, but it was a perfect picture of the robin while sitting on the limb of the tree above the sheep. This circumstance at the time elicited a good deal of controversy among a small circle of educated gentlemen in the immediate vicinity, and the only conclusion that could be arrived at was, that the current of electricity in the instant of its passage, carried the outline of the figure of the robin down upon the body of the sheep, the sheep having fallen (if it were not already lying) upon its side, before the body of the robin reached it in its downward descent. No doubt the sheep was lying down at the time of the stroke. Now whether the body of the robin absorbed a portion of the electric fluid, and in that way caused the picture (darkened as it was) upon the inside of the skin and upon the flesh of the sheep, I am not able to prove, but that has always been my theory of it. I do not desire to intrude upon your time and patience, but I will say that upon several other occasions I have witnessed effects of electrical action which I regard as totally outside of all information that I have yet been able to gain in regard to electricity, in any and all books written on the subject, or from any other source, having been somewhat of an experimenter myself with it, for the last twenty years. And at some future time when more expedient, I will endeavor to give several instances of strange productions by electrical force or power, which, I believe, will account for certain curious formations in nature in certain localities, which, up to this time, have not been accounted for on any scientific principles.

Thos. J. Logan.

Washington, D. C.

[We certainly hope our correspondent will favor us with any other facts in his possession relative to this interesting subject.—Eds.

Has the Pacific Railroad Changed the Climate of the Plains?

Messrs. Editors:—The scouts, guides, and hunters all agree in stating that on the Plains, as far back as their experience goes, little or no rains have fallen during the summer; but the experience of last summer and this one is, that we have sufficient rain for farming purposes, and the crops of hay and other produce raised here now attest it. The hunters with whom I have conversed all agree in stating that the rains only fall inside of a belt across the Plains of fifty miles in width, of which the railroad track is the center, that when they go beyond that belt the grass is red, crisped, and burnt-looking, while all vegetation inside is luxuriant. Has the iron of the rails or the upturned ground the credit of the change?

John Whitford.

Pond City.

(Pope's Modern Practice of the Telegraph.)

Conducting Powers of Materials.

According to the experiments of Mr. M. G. Farmer, made some years since, the relative electrical resistance of different metals and fluids at ordinary temperatures is as follows, pure copper being taken as 100:

Copper wire	100	Tin wire	6·80
Silver "	·98	Zinc "	3·70
Gold "	1·13	Brass "	3·88
Iron "	5·63	German silver wire	11·30
Lead "	10·76	Nickel "	7·70
Mercury "	50·00	Cadmium "	2·61
Pallad'm "	5·50	Aluminum "	1·75
Platinum "	6·78		

His experiments with fluids gave the following results:

Pure rain water	40,653,723·00
Water, 12 parts; sulphuric acid, 1 part	1,305,467·00
Sulphate of copper, 1 pound per gallon	18,450,000·00
Saturated solution of common salt	3,173,000·00
" " of sulphate of zinc	17,330,000·00
Nitric acid, 30 B	1,606,000·00

The following table gives the specific resistance in ohms (an ohm is an amount of resistance equal to that exerted by $\frac{1}{16}$ of a mile of common galvanized iron telegraph wire No. 9) of various metals and alloys, at 32° Fah., according to the most recent determination of Dr. Matthiessen:

NAME OF METALS.	Resistance of wire 1 foot long weighing 1 grain.	Resistance of wire 1 foot long 1-1,000th inch in diameter.	Approximate per cent variation in resistance per degree temperature at 20 degrees.
Silver annealed	0·2214	9·936	0·377
" hard drawn	0·2421	9·151	.....
Copper annealed	0·2064	9·718	0·388
" hard drawn	0·2106	9·940	.....
Gold annealed	0·5849	12·52	0·365
" hard drawn	0·5950	12·74	.....
Aluminum annealed	0·06822	17·72	.....
Zinc pressed	0·3710	32·22	0·365
Platinum annealed	3·336	55·09	.....
Iron annealed	1·2425	59·10	.....
Nickel annealed	1·0785	75·78	.....
Tin pressed	1·317	80·36	0·365
Lead pressed	3·236	119·39	0·387
Mercury liquid	18·746	600·00	0·072
Platinum silver alloy, hard or annealed, used for standard resistance coils	4·243	148·35	0·031
German silver, hard or annealed, commonly used for resistance coils	2·052	127·32	0·044
Gold silver alloy, 2 parts gold, 1 part silver, hard or annealed	2·391	66·10	0·065

The use of this table is as follows: Suppose it is required to find the resistance at 32° Fah. of a conductor of pure hard copper, weighing 400 lbs. per knot. This is equivalent to 460 grains per foot. The resistance of a wire weighing one grain is found by the table to be 0·2106, therefore the resistance of a foot of wire weighing 460 grains will be $\frac{0{\cdot}2106}{460}$, but the resistance of one knot will be 6,087 times that of one foot, therefore the resistance required will be $\frac{6087 \times 0{\cdot}2106}{460}$ = 2·79 ohms. If the diameter of the wire be given instead of its weight per knot, the constant is taken from the second column. Thus the resistance at 32° Fah. of a knot of pure hard drawn copper wire 0·1 inch in diameter would be $\frac{6087 \times 0{\cdot}94}{10000}$ = 6·05. The resistance of wires is materially altered by annealing them, and a rise in temperature increases the resistance of all metals. Dr. Matthiessen found that for all pure metals the increase of resistance between 32° and 212° Fah. is sensibly the same. The resistance of alloys is much greater than the mean of the metals composing them. They are very useful in the construction of resistance coils.

The highest value which has probably been found for the conducting power of pure copper is sixty times that of pure mercury, according to Sabine. Commercial copper may be considered of good quality when its conducting power is over fifty. Different samples of copper vary greatly in their specific conductivity, as may be seen by the following table, which gives the result of careful determinations by Dr. Matthiessen, the conducting power of pure copper at 59·9° Fah. being taken as 100.

Lake Superior, native, not fused	98·8 at 59·9°
" " fused (commercial)	92·6 at 59·0°
Burra Burra	88·7 at 57·2°
Best selected	81·3 at 57·5°
Bright copper wire	72·2 at 60·2°
Tough copper	71·0 at 63·1°
Demidoff	59·3 at 54·8°
Rio Tinto	14·2 at 58·6°

Thus Rio Tinto copper possesses no better conducting power than iron. This shows the great importance of testing the conductivity of the wire used in the manufacture of electro magnets, cables, etc.

Agassiz on Humboldt.

"Referring to Humboldt's career as an embassador at Paris, Professor Agassiz described a personal interview he had with him:

"His official position and his rank in society, as well as his great celebrity made him everywhere a cherished guest, and Humboldt had the gift of making himself ubiquitous. He was as familiar with the gossips of the fashionable and dramatic world as with the higher walks of life and the abstruse researches of science. He had at this time two residences in Paris; his lodging at the Hotel des Princes, where he saw the great world, and his working room in the Rue de la Harpe, where he received with less formality his scientific friends. It is with the latter place I associate him; for there it was my privilege to visit him frequently. There he gave me leave to come and talk with him about my work and consult him in my difficulties. I am unwilling to speak of myself on this occasion, and yet I do not know how else I can do justice to one of the most beautiful sides of Humboldt's character. His sympathy for all young students of Nature was one of the noblest traits of his long life. It may truly be said that towards the close of his career, there was hardly one prominent or aspiring scientific man in the world who was not under some obligation to him. His sympathy touched not only the work of those in whom he was interested, but extended also to their material wants and embarrassments. At this period I was twenty-four; he was sixty-two. I had recently taken my degree as Doctor of Medicine, and was struggling not only for a scientific position, but for the mean of existence also. I have said that he gave me permission to come as often as I pleased to his room, opening to me freely the inestimable advantages which intercourse with such a man gave to a young investigator like myself. But he did far more than this. Occupied and surrounded as he was, he sought me out in my own lodging. The first visit he paid me at my narrow quarters in the Quartier Latin, where I occupied a small room in the Hotel du Jardin des Plantes, was characteristic of the man. After a cordial greeting, he walked straight to what was then my library—a small book shelf containing a few classics, the meanest editions bought for a trifle along the quays, some works on philosophy and history, chemistry and physics, his own 'Views of Nature,' 'Aristotle's Zoölogy,' 'Linnæus' Systema Naturæ,' in several editions; Cuvier's 'Règne Animal,' and quite a number of manuscript quartos, copies which with the assistance of my brother, I had made of works I was too poor to buy, though they cost but a few francs a volume. Most conspicuous of all were twelve volumes of the new German Cyclopedia, presented to me by the publisher. I shall never forget, after his look of mingled interest and surprise at my little collection, his half sarcastic question as he pounced upon the great Encyclopedia: '*Was machen Sie den mit dieser Eselsbrücke.*' What are you doing with this ass's bridge?—the somewhat contemptuous name given in Germany to similar compilations. 'I have not had time,' I said, 'to study the original sources of learning, and I need a prompt and easy answer to a thousand questions I have, as yet no other means of solving.'

"It was no doubt apparent to him that I was not over familiar with the good things of this world, for I shortly afterwards received an invitation to meet him at six o'clock in the '*Gallerie Vitrée*' of the Palais Royal, whence he led me into one of those restaurants, the tempting windows of which I had occasionally passed by. When we were seated, he half laughingly, half inquiringly, asked me if I would order the dinner. I declined the invitation, saying that we should fare better if he would take the trouble. And for three hours, which passed like a dream, I had him all to myself. How he examined me, and how much I learned in that short time! How to work, what to do, and what to avoid; how to live, how to distribute my time; what methods of study to pursue—these were the things of which he talked to me on that delightful evening—I do not mention this trivial incident without feeling that it may seem too familiar for the occasion; nor should I give it at all, except that it shows the sweetness and kindness of Humboldt's nature. It was not enough for him to cheer and stimulate the student; he cared also to give a rare indulgence to a young man who could allow himself few luxuries."

English Telegraphs.—The Postmaster-General of England asks for £6,750,000 to buy up the electric telegraphs of the kingdom, and seems likely to get the money. In return, he not only promises cheap messages, a large increase in the number of offices, and other facilities, but after paying interest on the sum expended, he will have, in the first year, a surplus of £77,000. This surplus will of course increase with the increase in the number of messages dispatched. As regards the scientific part of the question, it is thought that the demand for improvements will be so constant, that invention will be stimulated, and that we shall see a succession of methods for applying the wondrous power of electro-magnetism excelling all hitherto compassed.

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THE ARSENIC EATERS OF STYRIA.

Men of science who traversed Styria have long reported the fact that there were people in Styria who consumed arsenic. However, this statement was denied by others, who affirmed that the white mineral they ate was nothing but chalk; and, as there were some quack doctors among the individuals, charged of that usage, it was asserted, that in making people believe that they took ratsbane they would give themselves the appearance of being protected from all diseases by it, in order to favor the sale of their drugs. Rumors and statements with respect to this subject had to remain without significance as long as chemical analysis had not given proof of the presence of that poison in the waste of the body.

Prompted by the importance of this subject, the royal medical counsel, Dr. Von Vest, occasioned the issue of a circular to the physicians of Styria, requesting them to communicate their experiences with regard thereto. Seventeen reports were obtained, from which the following is an extract:

The principal seat of the arsenic eaters—according to these —is the northern and northwestern part, the southern part, however, is free from them. The district of Hartberg in the former counts not less than forty individuals who indulge in that habit. From the various sorts of arsenic, the white arsenic, or ratsbane, is mostly taken, less so the commercial yellow, and still less the natural red arsenic, or orpiment. The arsenic eaters begin with the dose of the size of a millet, and increase this quantity gradually to the dose of the size of a pea, the weight of these quantities being 0·22, 0·56, and 0·62 grains avoirdupois, respectively.

These doses are either taken daily, or every other day, or only once or twice a week. In the district of Hartberg the custom prevails to suspend this unwise usage at the time of the new moon, to commence at the time when she is on her increase with the relative smallest dose, and to increase with it to the time of the full moon. From this period the quantity is diminished, but aloes is taken are increased doses till strong diarrhea is produced. Directly after the administering of arsenic, most people abstain from drinking, and with regard to aliment, some prefer pastry to meat, while others abstain from the taking of fat. However, the majority will take all kinds of food, indulging also considerably in the use of alcoholic beverages. Older persons who have been accustomed to that habit from their boyhood feel a sensation of warmth in the stomach shortly after taking the poison, complaining only of dizziness in the head after excessive use.

The ratsbane eaters belong mostly to the lower classes, wood cleavers, stable grooms, charcoal burners, and wood warts. They fall into that habit at the early age of fifteen, and continue it until the ages of seventy and seventy-six. Although the female sex is not averse to it, the majority belongs to the male sex. They are generally strong and healthy persons, courageous, pugnacious, and of strong sexual dispositions. The reason of this habit is very probably attributable to the fact of its apparent favorable action upon horses. If requested to explain the reason of their indulging in it, they will say that it is to make them strong and healthy.

The taking of arsenic is rarely practiced by sickly persons. Although the indestructible health of the mountaineer forms in the beginning a kind of an armor against the arsenic (the slowly-increased doses preparing the body for the assimilation of larger doses), most arsenic eaters end with an inevitable infirmity of the body.

Dr. Knappe, at Oberzeiring, sent to Professor Schaefer in Graz, who was intrusted with the chemical examinations, the urine of an individual who consumed arsenic for thirty years. He felt in the beginning great exhaustion, which regularly disappeared after a new dose, but never experienced headache, or burning in the throat or stomach. This person was observed from February 21, 1860. On that day he took a took a very small piece of arsenic; on the day after, a piece of 0·56 grains was swallowed by him in the presence of Dr. Knappe. On February 23, he took as much as 0·62 grains. During this time he showed great appetite, indulged considerably in spirituous liquors, and took leave perfectly well, on February 24. He stated that he used to take the respective quantities twice or thrice a week. With regard to the urine, chemical analysis did not fail to detect the presence of the poison with the utmost certainty, still, the traces found were not equivalent to the quantities swallowed. A second portion of urine furnished also but traces of arseniate of magnesia and ammonia. However, if it is considered that arsenic is not soluble, very the larger part leaving the body through other channels, the facts stated are easy explainable.

To the involuntary arsenic eaters in Styria belong the horses. The quantities given to them vary from five to one hundred grains. It is stated that after long-continued use, they get fat and courageous, but that they die shortly after suspending it.

With regard to the mingling of arsenic with the food of cattle and other domestic animals, the reports spoken of contain also remarks which are of interest, as they show how rapidly the organism adapts itself to so violent a poison, that the expulsion through the kidneys is only a small and long-enduring one, that the accumulation in the blood is considerable, and that the larger part is conveyed away through the intestinal passages.

The Sewage Question.

The desirability and the feasibility of applying town sewage to the purpose of fertilizing the soil are every day becoming more patent. We learn from the *Irish Farmer* that the recent attempt to utilize the sewage of the town of Banbury, in England, has proved, from every point of view, most successful. This town contains 11,000 inhabitants, and its sewage was formerly discharged directly into the river Cherwell, which it polluted to such an extent at to ultimately create a perfect *furore* against the nuisance. Law proceedings having been instituted by persons whose health and comfort had been affected by this sewage nuisance, the Lord Chancellor ordered an injunction to be issued restraining the town authorities from polluting the river. Subsequently to the law proceedings the local Board of Health rented a farm of 137 acres, situated about one mile from the town, and over which there is daily poured about three hundred thousand gallons of the town sewage. Before applying the sewage it is allowed to settle in tanks, and the solid matter which gravitates to the bottom is mixed with the sweepings of the street and the ashes and other solid refuse of the town, and the compound is sold to canal boatmen, by whom it is disposed to the farmers of the locality.

The rent of the Banbury sewage farm is £616 10s. per annum, and last year the sales of its produce amounted to more than £1,300, so that after paying all the expenses of management there was a good profit made on the sewage.

THE USE OF LEAD WATER PIPES.

While the evils attending the use of lead pipes for water are doubtless greatly exaggerated in the articles written upon this subject in the newspapers, no candid investigator has, to our knowledge, denied the existence of such evils or attempted to prove that such pipes are not objectionable in a sanitary point of view.

Though the use of these pipes is very extended, and startling cases of lead poisoning are not common, it must be remembered that lead is one of the most insidious of poisons, accumulating little by little in the system through long periods of time. The results, when produced, may not even in many cases be traced to the action of lead, and there is reason to believe that in certain ailments this cause is often overlooked. There is always a contingency that among a large number who use water contaminated slightly with lead, some one more susceptible than the rest will be injured.

In a recent paper read before the Scientific Club, at Waterbury, Conn., by Dr. C. S. Rodman, the following symptoms of lead poisoning were enumerated, some or all of which may be considered as the forerunners of serious disease:

1. A blue discoloration of the gums at their junction with the teeth. This was observed about the same time by Tanquerel, by Dr. Schilbach of Neustadt, and by Dr. Brinton of London. The discovery of this mark has proved a blessing to thousands. When present it is positive evidence of the poison; it is not, however, developed in every case. M. Brachet (Paris, 1850), states that it is almost always present in patients poisoned by inhalation.

2. A metallic taste and fetid breath. Observed also in slow poisoning from other metals, as mercury and copper.

3. Lead jaundice. Sometimes the complexion assumes an earthen hue; sometimes it becomes transparent and waxy, presenting an appearance of excessive delicacy.

Emaciation is an occasional phenomenon. These primary effects rarely coexist.

The diseases likely to follow are:

1. Colic, or neuralgia, chiefly abdominal. It is common, and well known as lead or painter's colic.

2. "Arthralgia," or neuralgia of the limbs. These are anomalous pains, chiefly in the limbs, and without redness or swelling. The cause being overlooked, rheumatism is generally assigned as the explanation. In true rheumatism the joints are most involved. In ordinary neuralgia, the pain chiefly follows the nerve trunks. In this affection the pain is in the finer branches of nerves distributed to the muscles.

3. Paralysis, or lead-palsy. Any muscles of the body may be involved. The arms, wrists, and fingers are oftenest weakened. Paralysis is usually only partial. Wristdrop is characteristic. Amaurosis, or paralysis of the retina; deafness and loss of voice are occasioned.

4. Cerebral Affections. The most frequent of these are convulsions; they are usually epileptic.

In view of these facts there cannot be two opinions as to the impropriety of using lead pipes for water when their use can be avoided, and pipes are now manufactured and sold, which insulate the lead from the water by a lining of block tin, a harmless material, durable, and not very expensive.

Car Wheels.

From Auchincloss' Report of the Paris Exhibition we extract the following:

"The practice of nations seems much divided on the subject of the proper material for car wheels. The wrought-iron wheel is almost exclusively adhered to in England, France, and Prussia; while Holland and Austria discover features worthy of attention in the cast iron. The general properties of the cast-iron spoke wheel are familiar to all. The Society of Providence (limited), whose office is at 208 Quai Jemmapes, Paris, display specimens of rolled wrought-iron wheel centers, without weld, whose radial section is similar to an I-beam. Upon such centers the tire is held with four seven eighth-inch rivets.

"The Society of Mines and Steel Works, Bochum, Prussia, exhibits a remarkable cast of wheels. It was formed by stacking the flasks twenty-two wheels high, with the hubs in contact, and then pouring in crucible steel through a side runner. Although this cast was made more as a matter of curiosity, it is quite customary with this company to arrange them in tiers of six wheels each, and thus save the numerous side runners required when cast singly. One swinging of the set in the lathe answers for facing up all the treads and flanges. These wheels have a single plate, and are forty inches in diameter. The Austrian exhibitions are by A. Ganz, of Ofen, Hungary, and Mr. Dernö, of the same section of country. The former gentleman is the most extensive manufacturer in Austria, and makes a double-plated wheel similar in design to that known in America as the 'Snow patent.' He exhibited a wheel 38 inches in diameter, cast in 1856, which has served under a 10-tun four-wheeled wagon for the past eleven years. The tread of this wheel appears in excellent condition, the metal close-grained without signs of honey-combing.

"The director-general of the Austrian I. R. P. State Railway Society certifies to the fact of this wheel having run 50,000 miles. The road on which these wheels are used is 419 miles in length, and pursues a southeasterly course from Vienna through Hungary. In respect to climate the trial is most severe. Its merits are certainly appreciated or the shop number would not extend as high as 84,981, which was noticed on a wheel cast during the present year. The wheels, as usual, have three core holes in the back. The only peculiarity about these holes is a V-groove cast near the opening, into which, when the core is removed, an eighth of an inch sheet-iron disk is sprung. This method is employed on wheels designed specially for passenger coaches, and prevents the entrance of stones, which, rattling within a wheel of so large diameter, become a source of much annoyance."

Editorial Summary.

We learn that the Erie railroad are about to adopt the electric, or Drummond plan, for lighting the Bergen tunnel, according to the suggestions in our article on lighting tunnels, published in these columns a few weeks ago. The Bergen tunnel is nearly one mile long and is said to have cost the Erie Railroad four million dollars. A number of railroad companies run their cars over the Erie track through this tunnel, and so great is the traffic that a train is within it nearly all the time. The passenger coaches have now to be lighted with lamps, and thus the passage through is a gloomy one. An oxygen light in the middle of the tunnel, with the use of Frink's patent reflectors, will illuminate the dungeon brilliantly, and the traveling public will hail its adoption with great satisfaction. The railroad companies will probably find that the cost is not greater than the expense attending the oil consumed in the cars, and the liability to accident will be greatly reduced.

PAINLESS CUTTING IN SURGERY.—At a late meeting of the British Medical Association, Dr. B. W. Richardson exhibited a knife consisting of a revolving blade, and which divided with such rapidity that superficial incisions could be made with it without pain. The revolutions were about twenty-five per second, but the speed might be greatly increased. The knife in its action illustrated that an appreciable interval of time is necessary for fixing an impression on the mind, and for the development of consciousness. He hoped he should soon be able to give to the surgeon a small pocket instrument with which to open abscesses, and perform many minor surgical operations painlessly, without having recourse to either general or local anæsthesia.

NEW PAVEMENT.—The city of Milwaukee is putting down a kind of pavement, which is described as follows: The old pavement having been removed, the earth is cut to the requisite depth to secure the proper guide for the surface. After the ground-work is thus prepared, it is covered with common inch pine board. Upon this foundation Norway pine plank, two by six inches, are laid edge up and spiked together. The planks being green, are readily sprung to the intended curve of the roadway, and then spiked. The pavement, when completed, will be covered with fine gravel, which will fill any remaining crevices in the surface.

HOW TO MAKE A VELOCIPEDE USEFUL.—Mr. Glimmer has arranged his velocipede with a churn behind and a coffee-mill in front, these useful domestic utensils being driven by the surplus power of the machine, so that when he takes his morning exercise he churns the butter and grinds the coffee, thus displaying his ingenuity and earning his wife's gratitude.

AERO-STEAM MOTORS.—The article on "Aero-Steam Engines," published in our last issue, will recall to the recollection of our readers the experiments of Wm. Mount Storm, made in this city in 1855, in the same field. We intended to give a complete review of these experiments and their results in the present number, but are forced to let the subject lie over for want of space

IT is a fact well-known to artists, that the splendidly bright color of vermilion (cinnabar, sulphide of mercury) has a tendency, especially if it has been mixed with white lead, to become blackish brown and very dark colored in a comparatively short time. This tendency of the vermilion is altogether obviated if, previous to being mixed with oil, it is thoroughly mingled with about $\frac{1}{8}$th of its weight of flowers of sulphur.

WE are glad to chronicle the fact that sixty-eight thousand children were present on the opening day of the public schools in this city. Give all the children a chance to obtain an education, and if need be compel parents to send their children to school.

BY the burning of the skate factory of M. T. Sperry, at Syracuse, N. Y., on the 17th inst., twenty-five thousand pairs of skates were destroyed.

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Improved Shelving for Stores, Public Libraries, Etc.

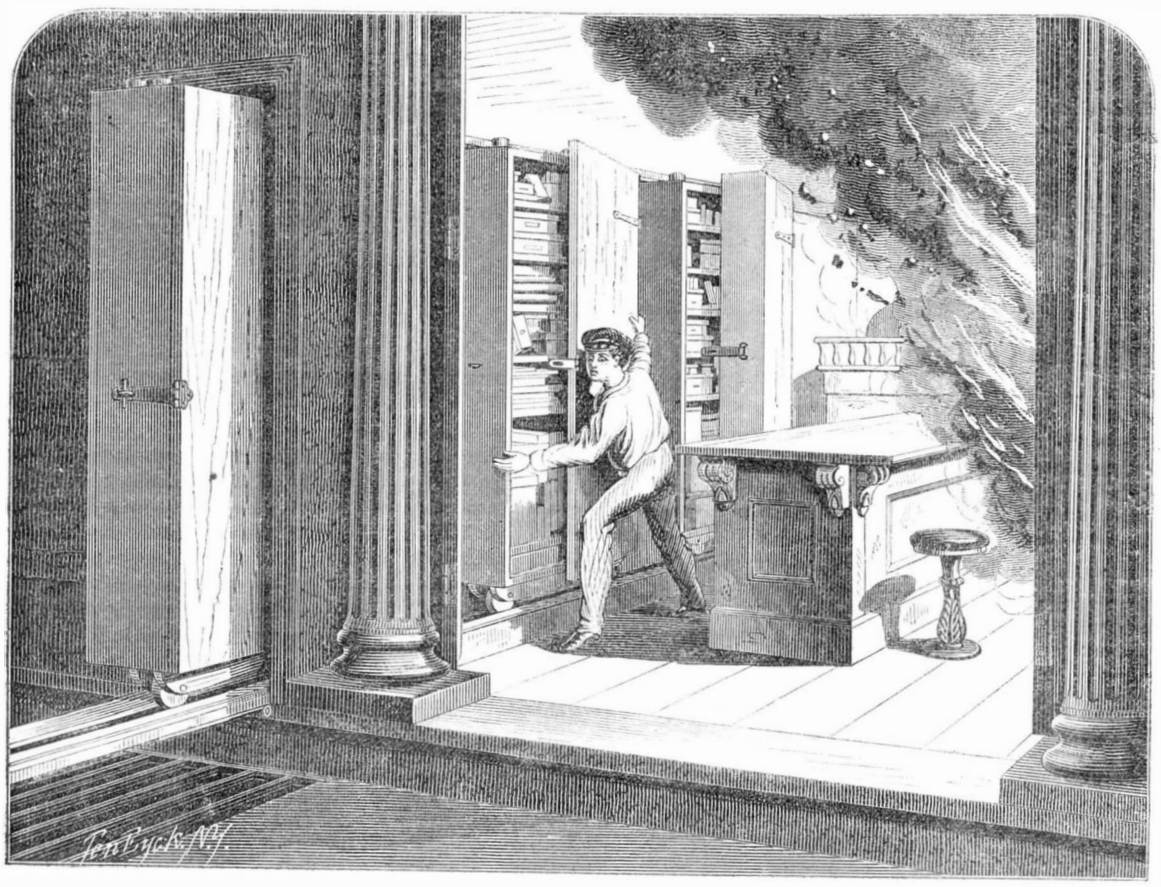
We might have appropriately headed this article "Mechanical Insurance," as it provides means whereby valuable stocks of goods, books in public libraries and cabinets, letter cases in post offices, etc., can be readily rescued in case of fire.

The engraving tells the whole story. The shelving is made in sections which can be closed with great rapidity, and run out of a building without moving goods or books, as the case may be. The sections are provided at the bottom with rollers or wheels which rest upon tracks; and at the tops are friction wheels, which, rolling along a fixed guide, act to steady the sections while they are being moved. In the front of the building doors are formed, hinged at their lower ends, which can be let down outwardly. Vertical rails are fastened to the inside of these doors in such a manner that when thrown down they form a continuation of the track on which the sections of shelving rest.

When the shelves contain only light goods, two or more sections may be hinged together and rolled out together, or so that they may be folded together face to face and fastened, thus protecting the goods, and rendering their removal more speedy.

When the shelves are designed to support heavy goods they are provided with covers hinged in such a manner that they may be turned back along the shelves so as to be entirely out of sight; but so that when needed, in case of emergency, they may be rapidly and securely closed, and the section trundled bodily out of the building.

This improvement merits general consideration, as its adoption would not only increase the safety of valuable property, but would doubtless lessen the rates of insurance.



WILLIAM AND GEORGE KOCH'S PATENT SHELVING.

Patented, July 20, 1869, through the Scientific American Patent Agency, by William and George Koch, of Cass, Pa., who may be addressed for further information.

A Grain Binder---How Farmers are Benefited.

The Davenport (Iowa) *Gazette* states that S. F. Parker, of that city, has recently introduced an improved grain binder, attached to the side of a reaper, the bed of which is traversed by a rake on an endless belt that carries the grain from before the sickle, when cut, and lays it over on the binder. This is a concave of sheet-iron in which the grain lies until bound. From a spool the twine unwinds through the tying apparatus, is caught by a nipper, carried around and wrapped tight on the sheaf, is tied into a perfect knot, is cut, and the sheaf drops to the ground securely bound. The making of the knot, never before accomplished in all the numerous attempts at binding by machinery, is completely successful; the mechanism by which this is accomplished being as certain in its operations as the making of a stitch by a perfect sewing machine.

The *Gazette* adds, respecting this improvement, that "once in successful use, they will revolutionize harvest work, and will add millions of dollars to the wealth of the nation, in the immense saving they will effect in the cost of securing the grain crops of the great West."

We entirely agree with our cotemporary respecting the value of a good grain binder to the grain-growing interests, but will these farmers who are to be so greatly benefited, pay the patentee cheerfully for his improvement?

A correspondent writing to the *World* from the State Fair, at Elmira, thus speaks:

"There is not, on the face of the earth, a body of men so easily inspired with a love of improvement and excellence as the rural population of the Empire State. Show them a mold-board, better by the smallest segment of a curve for inverting the sod, and they will honor you. Improve the horse-rake by the lightness or toughness of a single member, and they will discard the old and buy the new. Prove that Bates-Durham is better blood that Booth-Durham, and, presto, we have an English bull at the romantic price of a thousand guineas.

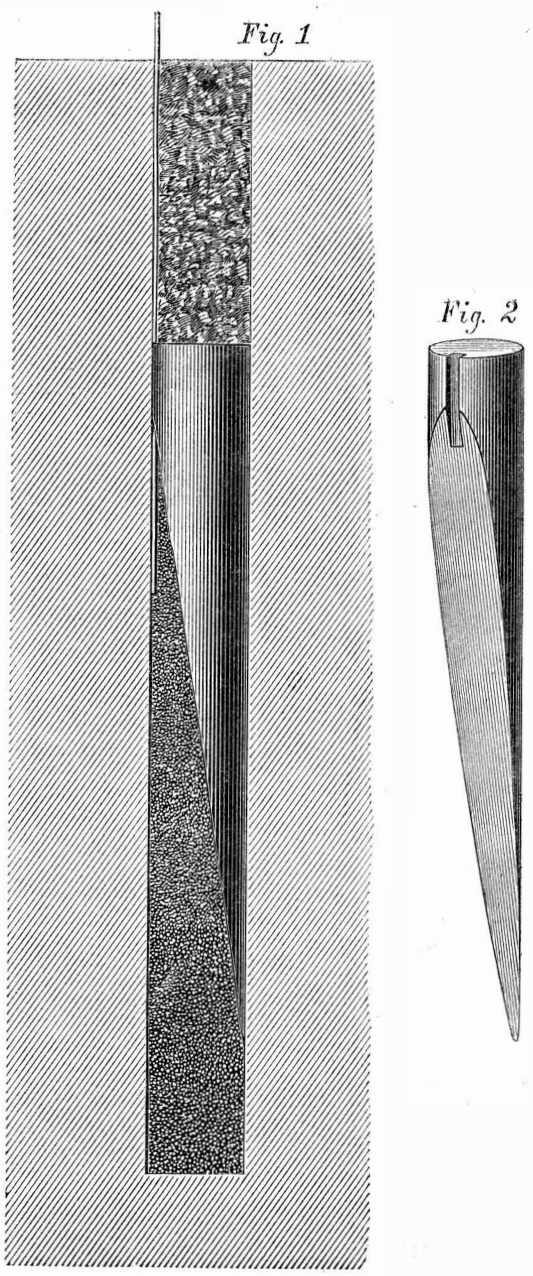
"The people of New York will go to a fair, drawn by the mild and temperate attractions of smooth potatoes, good cheeses, fat cattle, and excellent cooking stoves. They have been educated by the State Board to go for these things, not to see the fierce, enkindling rivalries of a horse race. This homely virtue should be wisely nursed. The board should see to it that they have the noblest of bulls, the best of horse-rakes, and the most cheering display of fruits and flowers to keep the interest alive and growing."

Copper Window Sashes.

These sashes are now manufactured in England under patent. The metal used is drawn copper, and is hard and tough. The sashes, when completed, are submitted to a bronzing process and are not affected by atmospheric influences The *Building News* says: "They have been experimentally proved to be weather tight, and are thus peculiarly adapted for resisting the attacks of heavy rain in exposed situations. The manner in which the parts are fitted together precludes the possibility of rattling in high winds, an evil too often painfully manifest under ordinary circumstances. Once fixed, these sashes may be designated as everlasting, and they require no painting or other attention. The glass is embedded on an impermeable putty, and fixed in its place by strips of copper attached with screws of the same metal. The first cost of the sashes is slightly beyond that of the ordinary kind, but their unquestionable durability more than compensates for the little extra outlay. In regard to their superior appearance nothing need be said, it is strikingly apparent, and will certainly be appreciated by architects and builders."

Improvement in Blasting Charges.

The object of this improvement is to save powder in blasting. This is accomplished by arranging the charge in such a manner as to get all the explosive power of the powder, much of which is lost in the common way of charging.



The engraving exhibits an improvement consisting of a plug having the form of a half of a diagonally cut cylinder, designed to be arranged in immediate contact with the powder or blasting charge in the drill hole, as shown in the engraving, whereby the charge will be caused to assume the same form, or nearly so, as the plug.

Fig. 1 represents a sectional elevation of a drilled rock showing the charge prepared and the plug inserted. Fig. 2 represents a face view of the plug. The charge is adjusted as follows: The powder is placed in the hole, the fuse fastened to the plug in the groove, Fig. 2, and then the plug is inserted in the hole and pressed down on the side of the powder, as represented in Fig. 1. The hole is then packed in the usual way with sand, brick-dust, or other materials. By this arrangement the inventor claims that part of the force of the explosion usually expended in an upward direction upon the packing, and which does not assist in separating the rock, is delivered laterally against the wall of the hole, as if a wedge were driven up alongside of the tapered face of the wedge (Fig. 2), thereby utilizing the whole force of the powder, and consequently lessening the amount of powder necessary for a charge by about one third.

Any further information may be obtained by addressing Gustavus Werlich, Watertown, Wis., who will send, without charge, samples of the plugs for trial, and who obtained a patent on the device described through the Scientific American Patent Agency, Aug. 3, 1869.

The Patent Office.

The expenses of the Patent Office under the new management are rapidly decreasing. On July 1st there was an unexpended balance of last year's appropriation of $18,000. This sum will suffice for all current expenses until the end of September. There will then be on hand $30,000 of appropriation for this year. Aside from this saving, the entire work of the office has been performed with fifteen less clerks than the law allows. For the first time the Commissioner's desk is entirely cleared of all back business which had accumulated during the previous administration. Besides savings mentioned, the old appropriation was so managed as to pay for the year's expense of photographing and manifolding drawings, which amounts to $25,000.

We are much pleased to hear so good a report of the Patent Office. In reference to the expense of photographing drawings, we regret to say that the work is by no means what it ought to be. The photographs are not artistically done, and we still prefer to prepare for our own clients a good copy of the drawing to be attached to their patents.

Steel Measuring Tapes.

Everybody, of course, is familiar with measuring tapes, but every one is not aware that steel has in this instance, as in others, been made to supersede linen. This has been done by Chesterman and Co., of Sheffield. They have produced a patent steel tape which is about the most unique thing of the kind we have ever seen. It is inclosed in a small metallic case, and acts on a spring as other tapes. Its advantages are portability, neatness, and exact measuring capability. The ordinary linen tape is liable to expand and contract, as heat or cold, dryness or dampness may prevail in the atmosphere, and they are constantly liable to be elongated by wear; in fact, they cannot be relied on at all for exact measurement. It is altogether different with the steel tape. It is not subject to atmospheric influence to any appreciable degree. It does not lengthen by use, and may be called a perfect instrument. It is extensively used by architects, surveyors, and contractors.

A Valuable Extended Patent.

It often happens that inventors are considerably in advance of public opinion in bringing out certain great improvements. Such, in fact, is the history of nearly all the most valuable inventions of the present day. Take, for example, the Nicolson Wood Pavement. The patent for this invention was originally granted on 8th of August, 1854, and through the Scientific American Patent Agency an extension of the patent was secured for seven years. During the first term of the patent very little if anything was made out of it. A ride through the streets of New York at the present time, would convince the most skeptical that the Nicolson extended patent was likely to prove valuable to its owners.

THE wide gage, says the *American Railway Times*, is a failure every way, and if the Erie managers will do away with it throughout their line—and by so doing they necessitate the adoption of the common gage on the Atlantic and Great Western, and the Ohio and Mississippi—they will deserve to be forgiven for some of their numerous offenses. All experience here and in other countries, proves the wide gage to be a great mistake, financially and mechanically. By all means let us have a uniform gage from the Atlantic to the Pacific.

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Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK

O. D. MUNN, S. H. WALES, A. E. BEACH.

☞ "The American News Company," Agents, 121 Nassau street, New York.

☞ "The New York News Company," 8 Spruce street.

☞ Messrs. Sampson, Low, Son & Marston, Crown Building, 188 Fleet st.; Tubner & Co., 60 Paternoster Row, and Gordon & Gotch, 121 Holborn Hill, London, are the Agents to receive European subscriptions. Orders sent to them will be promptly attended to.

☞ A. Asher & Co., 20 Unter den Linden, Berlin, are Agents for the German States.

VOL. XXI., No. 14...[NEW SERIES.]...*Twenty-fourth Year.*

NEW YORK, SATURDAY, OCTOBER 2, 1869.

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THE SOLVENT POWER OF WATER.

Of all the properties of that most remarkable and most important, though most common and abundant of liquids, water, none is more remarkable than its solvent power. It is one of the essential conditions to all organic life on the globe. Take away the solvent power of water and the earth would in a very short space of time be barren of vegetable and of animal life.

A simple solvent is a fluid which does not enter into chemical combination with the substance dissolved. Those of the most importance are water, alcohol, ether, chloroform, sulphide of carbon, glycerin, and hydrocarbon oils. All these are artificial except the greatest of all, water, and the hydrocarbons. The solvent power of water is so universal that among the salts known very few exist that it will not, in some measure, dissolve.

The fluids in plants and animals are wholly or in part composed of solutions of solid substances in water. Blood and milk are examples of fluids which hold undissolved organized matter in suspension; but the menstruums in which the organized particles float are found upon examination to be solutions of various saline and organic matters.

So great is the amount of mineral matter taken up by water in flowing over the earth to the sea, that were the process of returning it to the soil any other than that of distillation, all the water on the globe would soon become unfit for use in the animal economy. The circulation of water from sea to sky, from sky to land, and from land back again to the sea, is one of those grand operations of nature, which, when understood, excite the highest feelings of admiration. The sea is a great distilling apparatus, which, under the action of the sun's heat, throws off enormous volumes of vapor into the grandest of all condensers, the atmosphere. Here the vapor is again converted into a liquid, and falls upon the earth; but it has left in the bed of the ocean the burden of lime, magnesia, and other earthy and saline matters it carried to the sea on former journeys. It will return again with another burden, and be again distilled, and so on as long as the earth remains in its present form and condition. There can be no question that this process of abrasion and solution would eventually fill the seas and level all the mountains on the face of the earth, were it not for upheavals of portions of the earth's crust and the depression of other portions by the action of powerful internal forces. In this point of view even earthquakes may have their uses, and act to prevent the world from gradually becoming a vast aqueous desert.

The uses to which the solvent power of water is put in the arts are too extended for enumeration. It finds application in every household in cooking, cleansing of clothing, and almost all domestic employments, and in the industries of the world there could not probably be mentioned one, in which it does not directly or indirectly play an important part.

Nearly all are aware that the solvent power of water is greatly increased by heating it, but few are aware to what an extent this may be carried. In the experiments made by the French chemist, De la Tour, on the effects of high temperatures on liquids inclosed in hermetically sealed tubes, it was found that water heated in a space of four times its bulk, became steam at 773° Fah., and in this state exerted a powerful solvent power upon even such a refractory substance as glass. The decomposition of bones by the aid of superheated steam is a branch of manufacture now carried on to a considerable extent.

In the manufacture of lard on an extensive scale, the bodies of whole hogs are exposed to the action of superheated steam, which shortly reduces them to a mass of fluid fat, the disintegrated bones falling to the bottom in a powdered state.

Thus this universal and most wonderful fluid, more extensive in its applications than any other substance, and upon which the existence of man and beast and vegetable depends, not only drives the ponderous wheels of myriad manufactures, in its ordinary form, but when heated, its mechanical and chemical energies are so vastly increased, that man stands in awe of the mighty power his daring hand has invoked.

PROFESSOR HUXLEY AND SCIENTIFIC EXCLUSIVENESS.

We have ever been admirers of Professor Huxley's genius, but we see signs which lead us to believe that the single-mindedness with which he has devoted himself to scientific study, is producing a state of mind in this investigator for which we can find no word so expressive as exclusiveness. A writer in *Appleton's Journal*, describing the personal peculiarities of Professor Huxley, recently stated that he was not only fond of following, but did follow the standard current literature of the day; yet not long since he is reported to have styled the language of some writers who, not having followed so closely as himself the scientific discussions of the day, cannot be expected to evince so deep an interest in them, and who had expressed some doubts as to their value, "sensuous caterwauling."

This is not the first time the same gentleman has let loose his scientific wrath against those who do not believe the sole end of man is to store his mind with scientific knowledge. We can readily see how one of the high priests of science like Professor Huxley, having entered into the "holy of holies" of her temple, may be impatient of the opinions of those who have not even entered the outer gate; but we think it well for even the most learned to guard against the error of measuring other peoples' tastes or acquirements by their own. Those who have made classical learning the *sine qua non*, and have looked down upon men without Greek scholarship as ignoramuses, no matter how much they knew of geology, have justly been condemned for their intolerance in this respect; and the scientific man, no matter how distinguished in his own field of research, is no more justifiable in depreciating the knowledge of others.

Mr. Huxley is not, however, content with satirizing unscientific literary men, but he sometimes permits himself to drop a remark calculated to show depreciation of those sciences which he has not made his peculiar specialty.

In a recent article in *Macmillan's Magazine*, he let something of this kind escape him with reference to mathematical science. We are glad to see that this has not been allowed to pass unquestioned. At the recent session of the British Association at Exeter, one of the leading English mathematicians, Professor Sylvester, called him to account. "It would seem," he said, "that, according to Professor Huxley, the business of the mathematical student is, from limited propositions, bottled up and ready for future use, to deduce any required result by a process of the same general nature as a student of language employs in declining and conjugating his nouns and verbs; that to make out a mathematical proposition and to construe or parse a sentence are equivalent or identical mental operations. Such an opinion scarcely seems to need serious refutation."

"No statement could have been made more opposite to the facts of the case than that mathematical analysis is not constantly invoking the aid of new principles, new ideas, and new methods not capable of being defined by any form of words, but springing directly from the inherent powers and activity of the human mind, and from continually renewed introspection of that inner world of thought of which the phenomena are as varied, and require as close attention to discern, as those of the outer physical world, to which the inner one in each individual man may be conceived to stand in somewhat the same general relation of correspondence as a shadow to the object from which it is projected; that it is unceasingly calling forth the faculties of observation; that one of its leading features is induction; that it has frequent recourse to experimental trial and verification, and that it affords a boundless scope for the exercise of the highest efforts of imagination and invention."

It will not do for a man who has made as bold speculations as Professor Huxley, to disparage a science which, if not directly, has indirectly furnished him important data on which to found his theories, and there will not be wanting those who will see in such attempts, a want of liberality, surprising in one of such broad views as he generally takes of most subjects.

HARD AND SOFT WATERS.

Those extensively engaged in dyeing, or in any other industry involving the use of comparatively pure water, find it necessary to study the quality of the water they use, and as a rule, are not only thoroughly posted in regard to the characters of the different waters, but as to the proper means to be employed to free them from such substances as materially interfere with their use in the arts.

But among the masses there is considerable confusion of mind in regard to the terms "hard" and "soft," as applied to water, or rather confusion as to what constitutes hard water, and also as to the proper means to render it soft. The popular idea in regard to hard water is that it contains lime; lime being the supposed substance that curdles the soap when the water is used in the washing of clothing. The fact is, however, that the ingredient which renders the water hard is nearly as often magnesia as lime, and quite as often a mixture of both.

These substances are often found in water in the form of carbonates held in solution by carbonic acid. On the contrary, the carbonates of lime and magnesia are insoluble in water free from carbonic acid. It follows that any substance which will combine with the carbonic acid present will precipitate those salts, and the water will thus be rendered soft.

Lime is also found in water in the form of a sulphate and magnesia in the form of a chloride. As the substances named are the ones most objectionable, so far as the laundry is concerned, we will not here enumerate the large list of mineral substances which may be met with in the examination of waters found in various localities.

It is obvious that to act intelligently in removing these substances from water, the exact nature of the impurity should be known. The tests are extremely simple and can be applied easily. The test for the presence of lime is the oxalate of ammonia. A few drops of a solution of this salt poured into water, produces a well-defined milkiness when any of the salts of lime are present.

To determine whether the lime thus indicated is in the form of a sulphate or carbonate (or both may be present), boil down a portion of the water in a glass bottle until a pellicle forms; to the fluid in the bottle add hydrochloric acid, and if effervescence ensues, it indicates the presence of a carbonate of lime or magnesia, or both. If the solution entirely clears up, that indicates absence of sulphate of lime. If it remains turbid sulphate of lime is present. It is not important to distinguish between the carbonates of magnesia and lime, as both can be thrown down by the addition of newly-slaked lime. This should be put in the water, in the form of milk of lime, small quantities at a time, or better, the exact amount of milk of lime necessary may be easily computed. Find by experiment upon small but definite quantities of the water the exact amount of milk of lime of a given strength, that can be added to those definite quantities without rendering the water alkaline. This can be tested by the use of red litmus paper, which is turned blue by the weakest alkaline reaction. The amount of lime that a pint or a quart of the water will thus neutralize being ascertained, the amount necessary for any quantity can be at once determined.

Lime thus added also precipitates organic impurities. In many cases, however, the mere boiling of water will throw down the salts of lime and magnesia, by driving off a portion of the carbonic acid through the agency of heat. When lime is added the carbonic acid instead of escaping with the steam, as when water is boiled, unites with the added lime, to form a carbonate precipitating in common with the mixture of all the carbonates present. The carbonates of soda and potash will produce similar effects, the carbonate of soda (washing soda) being in common use to remove the carbonates of lime and magnesia from water where they are present. An excess of the carbonate of soda, if not too great, will do no harm when used for this purpose. This salt also precipitates the sulphate of lime.

The chlorides of the earthy metals are not often found in the waters commonly used for domestic purposes in quantities sufficient to injure them.

THE EXHIBITION OF THE AMERICAN INSTITUTE.

The most important departments in this exhibition are, or were at the time this article was penned, still incomplete. The only machine running was Baxter's portable engine, illustrated on page 363, last volume of the SCIENTIFIC AMERICAN, which was attracting much observation. In fact it may be set up and put to running with as little trouble as a parlor stove, and needs scarcely more attention.

Owing to the still chaotic state of the machinery department we are obliged to defer a detailed notice of the machinery, of which there will be a much more extended display than has ever before been brought together at a Fair of the American Institute. We are, however, enabled, partly from personal observation and partly through the assistance of Erastus B. Bigelow, Esq., President of the National Association of Wool Manufacturers, also President of the Bigelow Carpet Co., and the inventor of the power carpet looms, and other important improvements in woolen machinery, to furnish some facts relating to the

JOINT EXPOSITION OF THE WOOL INDUSTRY OF THE UNITED STATES,

held by the above Association under the auspices of the American Institute. The object of this exposition, as announced in the *Bulletin* of the Association for January, is to show to the country "the extent, variety, and development of the American wool industry, and the support which it affords to other departments of production—to make known to the American people their dependence upon their own productions, and serve to create that public sentiment in favor of the products of our own soil and labor, which is indispensable to the proper success of our manufactures, and which, at the same time, will, by emulation and example, elevate the standard of this industry and its dependencies." It was desired by the Association to make the exposition eminently national, and to this end they asked for "the co-operation of persons engaged in all the departments of the wool industry North and South, East and West; of those not concerned with the Association, as well as its members; of producers in all the industries and arts, directly auxiliary to the wool industry; of manufacturers of fabrics of every description, composed wholly or in part of wool, and of made-up articles from such fabrics; the growers of raw material; the manufacturers of dyes and chemicals, and furnishers of supplies of all kinds for this industry; and the makers of machinery of every description, used di-

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rectly in the manufacture of woolen or worsted fabrics;" in fine, the committee hoped "to see displayed at this exposition every natural or artificial product directly contributing to, or resulting from the American wool industry, and all such instruments of production as are applicable thereto."

So far the exhibition of machinery, raw materials, chemicals, and general supplies for the wool industry, is very meager. Such machines as are present will be noticed hereafter with other machinery when power is supplied to put them in operation. The committee may, however, congratulate themselves on the

DISPLAY OF FABRICS,

which is undoubtedly a finer representation of the present condition of the wool industry in the United States than was hoped for by the most sanguine. We wish the advocates of free trade might ask themselves, while looking at this splendid collection—exhibiting as it does immense success achieved against countless difficulties—whether victory must now be turned into ignominious defeat, by withdrawing from the American manufactures that protection through which they alone can exist? We wish they would ask themselves, even admitting the truth of their repeated assertions that protection is enriching the American capitalist at the expense of the American consumer, whether it is better to enrich

BRITISH CAPITALISTS

at the expense of American consumers, than to keep the profits of this trade in our own commonwealth.

The wool industry in this country is now only fairly prosperous. That is the whole truth in regard to this matter. Money invested in it pays no more profit than would be entirely within the margin considered as perfectly legitimate in other lines of trade. Those who croak about huge monopolies increasing the wealth of the rich at the expense of the poor, are many of them making far larger profits upon capital invested, than woolen or iron manufacturers can average by the exercise of the severest economy, and the use of the most approved appliances in the production of these staples; and a large majority of those croakers are men, who are either immediately engaged in the importation of foreign goods, or are, directly or indirectly, interested in such importations.

We trust this fine display of American woolen goods will convince many hitherto wavering on the tariff question, that such protection as we advocate (not prohibition, as the apostles of free trade would make the public believe, but such protection as permits of fair competition with foreign manufactures) is absolutely necessary for such a development of our national resources as becomes a powerful and independent commonwealth.

This exposition is also of the greatest importance for the reason that the fabrics exhibited are from the regular and general stock of the country. No prizes have been offered and competition has not stimulated the exhibitors to show better goods that they can average. We therefore see here, a genuine sample of the American wool industry with none of its defects covered and none of its merits exaggerated.

One of the most interesting, if not the most important of the fabrics shown in this department is the

AMERICAN BUNTING,

manufactured under patent by the United States Bunting Co., Lowell, Mass. Our readers are well aware that the old style of bunting was made into flags by sewing strips of different colors together, and the stars or other devices were also stitched on, or inserted into material of a different color. The American bunting is first woven like the old, but in dyeing the stripes, stars, or other designs are colored in the piece so that no sewing is necessary. We are informed that flag-makers are universally adopting this bunting, and that no less than 3,000 yards per day are now made at the works of the company.

To within a very short time all our flags were made of English bunting, so that even our national banner was a humiliating witness to our dependence upon the industry of other nations. American genius has, however, triumphed over the disabilities which involved such a necessity. Now the American flag may be made of American wool by American labor, and "long may it wave" over a land independent in deed as well as in name.

Another most important line of goods on exhibition is

AMERICAN CARPETS,

among which the goods manufactured by the Bigelow Carpet Company are conspicuous for beauty of design and color as well as quality of the textures. This company exhibits Brussels and Wilton carpets, and Wilton rugs and mats, the beauty of which will be acknowledged by all who see them. The manufacture of these goods is now well developed and fairly prosperous.

Alexander Smith & Co., of Yonkers, N. Y., exhibit a line of Axminster carpets, which we regard as fully equal to imported goods of the same class.

There were, at the time of the present writing, as yet no tapestry carpets on exhibition, though the superintendent of the department, N. Kingsbury, Esq., informed us that there would be in a few days. This gentleman is an extensive American wool manufacturer, and the success of this exhibition is largely due to his courteous and energetic supervision.

The Hartford Carpet Co. exhibit samples of Brussels, which, however, do not, in our own opinion, properly represent the character and variety of the goods made by this firm, which sustain an excellent reputation. It is, however, due to this company to state that Brussels carpeting is only an incidental branch of manufacture with them, their works being chiefly devoted to the production of ingrains.

The Lowell Manufacturing Co. exhibit a rich and choice display of two-ply and three-ply ingrain carpets, which cannot probably be excelled. They are not only a credit to the company but to the country. The same company exhibit a line of

LASTINGS,

a new and important article of manufacture in this country, and which, through the enterprise and perseverance of the company, has become well established. The same company also exhibit a first-class line of reps. There are only a few manufacturers who make this class of goods in this country, of whom we believe this company ranks first.

The manufacture of lastings may be said to have been literally created by the late tariff. It could not exist before the imposition of that tariff, and it now lives only through such protection. This material enters largely into the shoe manufacture, and is therefore of great importance. Every yard of it used in the country ought to be made in the United States.

The Crossley Co., of Bridgeport, Conn., exhibit

PRINTED WOOLEN GOODS,

consisting of crumb cloths, felt druggets, robes, linings, etc., etc., a fine showy line of goods, and very attractive.

The Lippet Woolen Co., of Woonsocket, R. I., astonished us by the great variety and exquisite quality and finish of the large variety of

FANCY CASSIMERES

they exhibit. The silk mixed goods produced by this firm are specially elegant, the silk used being made by Cheney Bros., of Hartford; these goods owe, therefore, nothing to foreign labor in their manufacture. Good goods of this kind are considered as difficult to produce; though many establishments in America, are, we believe, producing goods that can be ranked with the original textures made at Elbeuf, in France, of which they are perfect imitations. As first class the goods of the Lippet Woolen Co. must be ranked, and nothing but prejudice could induce a preference for imported rather than these silk-mixed cassimeres.

The Pacific Mills, of Lawrence, Mass., have, in our opinion, as fine a show-case of goods, and as tastefully arranged, as any to be met with on the floor, consisting of

MOUSSELINE DE LAINES AND WORSTED GOODS,

a great variety, which we cannot particularly specify. The reputation of these manufacturers, always high, must inevitably gain by this display. If we mistake not this is the largest woolen manufacturing establishment in the United States, and its officers are most active and intelligent supporters of the cause of American industry as opposed to importation of foreign wares.

The Washington Mills, of Lawrence, Mass., exhibit a beautiful line of

WORSTED POPLINS AND TARTANS

in a great variety of styles. They also exhibit a fine class of Thibets, flannels, broadcloths, shawls, table-covers, cassimeres, etc., etc. This is one of the most extensive lines exhibited, and a fine example of American progress in the woolen industry.

These poplins were never made in this country until last year. This company has also succeeded in producing the Scotch cassimeres in great variety and perfection. This is considered as one of the most important of the recent triumphs achieved in the card-wool industry of the United States.

The Salisbury Mills are also represented by a fair line of goods. We were unable to obtain much information as to this company's manufactures, and this was the case also with several other establishments, having goods on exhibition not yet arranged and labeled. This must be our excuse for passing some meritorious displays without notice at this time. If we find it possible to again return to this interesting department we will endeavor to do them full justice.

Scheppers Bros., of Philadelphia, exhibit a beautiful case of

WORSTED DRESS GOODS AND ALPACAS,

which cannot be excelled by any imported goods of the same class. These gentlemen came to this country from Germany, where they formerly conducted the same manufacture, being induced to come through the protection afforded by the tariff on manufactured woolen goods. This alone enables them to compete with foreign manufacturers, and its removal would compel them to abandon their business in this country. So it seems protection not only keeps money at home, but draws it from abroad. Free trade apostles will please take notice of this significant fact.

Upon this point the *Bulletin* of the Association, for July, remarks that "the present exodus of skilled workmen from the manufacturing towns of England to this country, so alarming to British employers, exhibits the European estimate of the rewards for labor offered under our protective system. Under this system we appropriate, not only workmen, but employers and establishments; we import, not merely people, but arts. Such an acquisition is truly, as Fuller styled the immigration of wool-spinners and weavers to England in the reign of Edward III., 'a treasury of foreigners.' It was thus that England was enriched from France, after the revocation of the Edict of Nantes, and so France was enriched from Holland and Germany, in the time of Louis XV.

The Scheppers Bros., in a letter to the New York *Tribune*, dated June 14, 1869, make the following statement of the reasons which induced them to come to America, which is important as showing the light in which intelligent foreigners view the subject of protection in this country: "Believing that under the American policy of protection the finest silk-finish alpacas and poplins can be manufactured here cheaper and better than they can be imported, we have come here from Belgium to cast in with you—to consume your wool, to employ your labor, and to supply you with home manufactures superior to the finest foreign.'

Bauendahl & Co., of New York city, exhibit many different grades of goods, from fine and rich to common and cheap for ordinary use. The cheap goods are of good quality, and are well adapted to the use of those who value durability more than style and finish, though both the style and finish are superior for goods of this class.

The Conshocken Woolen Mills, Benjamin Bullocks' Sons, Philadelphia, exhibit a large assortment of

BROADCLOTHS,

which demonstrate a commendable progress in the manufacture of this class of textures.

The Lawrenceburg Woolen Mills, of Lawrenceburg, Ind., exhibit through their agent, A. T. Stewart, of New York city, a line of excellent cassimeres, for which they have justly acquired a high reputation. Some of these goods, as well as some of the cassimeres noticed above, are of kinds difficult to make, and the success already attained is highly creditable to the ability of their producers.

Wm. Duncan & Sons, of Franklin, N. J., exhibit a case of beautiful goods, consisting of

FLANNELS, TABLE-COVERS, CASSIMERES, AND SILK-EMBROIDERED PIANO-COVERS,

and other goods, which we have not space to name. The character of these goods adds greatly to the interest of this department. The cashmeres and the blankets especially will attract universal attention as a specimen of American manufacturing taste and skill, in which qualities these manufacturers excel. They have also carried the manufacture of printed woolens to a very high point of perfection.

We are very glad this feature of the exhibition has been so well carried out, though, from the known energy and enterprise of the officers of the National Association of Wool Manufacturers, we have felt sure, from the first, it could not fail of proving one of the great attractions of the Fair.

There are many reflections in which we are tempted to indulge at the close of this brief and necessarily imperfect sketch. No one can look through this collection without being impressed with the extent to which the wool industry has been developed in the United States under the present protective system. To secure permanency and further progress it will be necessary to keep the tariff on raw material so adjusted that manufacturers may be placed in the same position as though this material were duty free, while the tariff on manufactured goods should be maintained at just such a standard as will compensate for the difference of wages paid in Europe and in this country. Thus both the fatal alternatives of crushing this industry or of depressing American labor, may be avoided.

DEPARTMENT OF AGRICULTURE AND HORTICULTURE.

The old days when farming was done by "main strength and ignorance," have given way to wiser methods. Year after year inventors have been able to gradually transfer labor from man to beast, and thus lessen the severe work of the farm. But little of the old-time "hard work" remains. Digging potatoes and the loading of hay upon wagons are in a measure unvanquished, although inventors are vigorously attacking them, and the time cannot be far distant when the modern system of farming made easy, will be completed by the addition of perfect machines for the performance of these kinds of work. We shall, in the present article, only review the display of

AGRICULTURAL MACHINERY.

In this department we see no very marked advance since the last exhibition of the American Institute, yet, when we consider the perfection to which agricultural machinery had been carried in 1867, we ought not to expect an advance so great as to supersede, to any very appreciable extent, the improvements then exhibited. There is enough here, however, to command earnest attention. The

MOWERS AND REAPERS

constitute, of course, a conspicuous class. It is safe to say that in these machines the United States can beat the world; and there should have been a better representation of manufacturers throughout the country than is apparent in this exhibition. Quite a number of the most prominent manufacturers, however, exhibit machines, most of them familiar to our readers. Five machines seem to attract more attention than others on the floor, namely, the Wood's Mower, the Wood's Self-raking Reaper, manufactured and exhibited by the Walter A. Wood Mowing and Reaping Machine Co., Hoosick Falls, N. Y., the Perry Mower, made and exhibited by the Ames Plow Co., Boston, Mass., the Columbian Mower and Reaper, made and exhibited by the American Agricultural Works of New York, and the Buckeye Mower and Self-raking Reaper, exhibited by Adriance Platt & Co., of New York. Without any derogation from the special merits of other machines on exhibition, it may be said that the ones mentioned are specially worthy of mention. The Wood's machines took the first premium at the Paris Exposition of 1867, on a competitive trial in the field, and the Perry Mower also took a premium at the same trial. The Buckeye justly meets with favor from a large proportion of American agriculturists, and is preferred by many to any other. All of these machines have, if we mistake not, met with a formidable rival in the Columbian Mower and Reaper, which, although we have never seen it in actual work, we are confident contains every element of a good substantial and easy running machine.

The Nishwitz's Improved Mower and Reaper, made and exhibited by F. Nishwitz, of Williamsburgh, N. Y.; the Climax Mower, which has its gearing entirely inclosed in a cast-iron box about three feet long, one foot high, and one foot broad, made by the Corry Machine Co., Corry, Pa., and the Etna Mower and Reaper, manufactured and exhibited by the Etna Manufacturing Co., of Salem, Ohio, are good machines, and well worthy of public favor. The Walter A. Wood Mowing and Reaping Machine Co. will shortly exhibit the machine exhibited by them at the Paris Exposition, which is probably as highly finished as any machine of this kind ever made. It cost the company fifteen hundred dollars.

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We saw no thrashing machine on exhibition except a hand machine adapted for work in a small way. The exhibition of

PLOWS

is also meager, the principal exhibitors being Griffing & Co., of New York; Collins & Co., of Collinsville, Conn., R. H. Allen & Co., of New York, and the American Agricultural Works of New York. Among these the Hartford Cast Cast-steel Turf and Stubble Plow, exhibited by Collins & Co., and the Corn Plow exhibited by the American Agricultural Works are the most noticeable.

Some very peculiarly constructed harrows are also exhibited, some with revolving blades, some with revolving frames, and some the use of which would be hard to guess without an explanation which no one was on hand to give.

An interesting feature of this department is found in the

COTTON AND HAY PRESSES,

of which there are several worthy of special mention. Chapman's Cotton and Hay Press, made and exhibited by Whitney & Co., of Boston, Mass., seems one of the most effective presses for cotton we have met with. The pressure is applied to the follower by means of short links, through a very peculiar and ingenious series of clutches engaging with two upright square bars, one on each side of the press. These clutches are operated by levers, so that a motion, comparable to nothing more nearly than to steps in walking, is imparted to them. No perfect description of this press can be given without diagrams, but it is a most simple and effective machine, one of its advantages being, that when the bale is stitched and banded, the follower may be easily and rapidly raised to the proper hight without reversing the motion which imparts the pressure, as is the case with screw presses.

The Albertson Hay Press, made and exhibited by James M. Albertson, of New London, Conn., a segmental screw press; the Dederich's Parallel Lever Cotton and Hay Press, exhibited by the Whitlock Exposition Co., New York city; a toggle link press, born in Albany, and the Ingersoll Hay Press, made and exhibited by Ingersoll & Dougherty, Greenpoint, N. Y., are also all powerful, convenient, and substantial presses. Among the

MINOR IMPROVEMENTS

may be noticed the potato-digging plow made by R. H. Allen & Co., of New York city, which is a low double mold-board plow with prongs extending rearward to separate the roots from the earth.

The hand cider and wine mills exhibited by Griffing & Co., of New York city, the Hovey's Patent Wine and Cider Mill and Press Combined, and the Daniell's Improved Cider mill are very neat, and, as shown by their practical working at the exhibition, effective, portable machines, occupying very little space, but very well finished, and substantially constructed.

Bendix's Potato Planter, like an expert accountant, operates on two rows at a time, covering them, it is claimed, by the same operation, in a most thorough, satisfactory, and perfect way, with one man and a horse performing an amount of labor executed in the usual manner by twenty men.

Lozier's Hay and Grain Loader is a system of pulleys attached to a swinging arm hinged to an upright standard, so that a rope may raise a horse hay fork with a large mass of hay which may be swung to any part of the wagon. The rope is wound up by the motion of the cart wheels, and by a simple device, may be quickly released to lower the fork when the hay is dropped into the wagon.

There are the usual quantity of straw and root cutters, and other minor implements on exhibition, among which we saw nothing specially new or remarkable.

Among those articles difficult to class in a description of this kind we notice Prindle's Patent Agricultural Steamer, a fine piece of apparatus evidently constructed upon sound scientific principles. All sorts of general cooking and steaming of forage for animals can be economically done in this apparatus without any danger of burning, and it may be used to heat water, or even to perform distillation. This excellent steamer is manufactured and exhibited by R. H. Allen & Co., of New York city.

Also worthy of special mention is the cut hay in bales manufactured and exhibited by the Hudson Hay Cutting and Baling Company, of New York city, a new, and we understand, rapidly increasing branch of business.

The Egg Carrier, Dorn & Seeley's patent, is another Albany invention, and a good thing. It consists of a series of trays with loose canvas bottoms and paper partitions, set one over the other in a sort of crate. The eggs placed in these partitions do not touch each other or any solid material whereby they may become broken, and may be thus transported long distances in perfect safety without the additional weight of the oats in which it has hitherto been the custom to pack them. The exhibition of

SCALES

seems confined solely to the Sampson Scale Company, of New York city, who exhibit hay, iron, and other styles of their celebrated scales. These, though not perhaps strictly belonging to the agricultural and horticultural department, are placed therein as a matter of convenience, and are therefore noticed in this connection.

On the whole there is much of interest and encouragement in this department of the exhibition.

Agricultural Improvements.

The meeting of the Royal Agricultural Society at Manchester, besides showing improvements in live stock and farm and dairy produce, made clear to all beholders that the application of machinery to agriculture has become more and more practicable. There were nearly eight thousand machines and implements exhibited, and this fact alone implies a large and lively demand. Among them were horse pitch-forks, which, by a combination of poles, ropes, and pulleys, will fork hay or barley from a wagon to the top of the tallest rick with surprising rapidity. Plows are made to effect eight furrows at once by the aid of a steam engine; and steam cultivators loosen at once breadths of from nine feet to eighteen feet, and work to a depth of six inches. No wonder that the number of those enterprising persons increases who undertake to plow farms in any part of the country by contract. Another contrivance lays down iron shoes as a sort of endless rail under the wheels of carts on soft roads; and thus another farming difficulty is overcome. And hard roads are not neglected, for a 15-ton roller has been constructed which bites up the surface of an old road, and presses down solidly a layer of new macadam at the rate of half an acre in ten hours, and at a cost of a farthing a square yard (superficial).

THE NEW LIGHT.

Our readers have been made acquainted from time to time, with the progress of a light called the Oxygen Light, probably for want of a better appellation. The principles upon which this light is based, were stated in our report of the lecture delivered by Professor Doremus before the American Institute last winter, which will be found on page 87, Vol. 20, SCIENTIFIC AMERICAN.

To save our readers trouble, we will, however, recapitulate the features of this improvement. The well-known calcium or Drummond light was produced by directing a jet of mixed oxygen and hydrogen upon a pencil or pure lime, the gases being conveyed in separate tubes or pipes, to within a very short distance from the aperture through which they were delivered, and then flowing together and mixing in very minute quantity before combustion took place. This arrangement was adopted to secure safety, as these gases being mixed in the proportion of two of hydrogen to one of oxygen, the proportions best adapted to produce good results, form a very explosive mixture; and as their combustion does not depend upon any external substance, the flame may, upon the removal of pressure, run back through a single tube containing the mixed gases to the receptacle where they are stored and produce serious disaster.

The substitution of the common street gas for the pure hydrogen was found, while more convenient, to not greatly diminish the illuminating power. Oxygen was, however, until the discoveries of Tessie Du Motay and Marechal, an expensive gas to obtain unmixed, and the Drummond light was therefore only employed upon extraordinary occasions, its expense precluding its general and popular use.

The eminent scientists above named found that the salt called manganate of soda absorbed large quantities of oxygen under ordinary circumstances, and discharged it again when subjected to the action of superheated steam. By this means oxygen can be obtained sufficiently pure at a price, we are informed, not exceeding one dollar per thousand cubic feet.

In the attempt to render this cheap oxygen in connection with the cheap street gas available in application to popular use, it was found that something more durable than the lime pencils was necessary. Pencils of magnesia were substituted and subsequently, of the oxide of zirconium; and the light produced by the ignition of these materials is undoubtedly the most brilliant and powerful light ever produced at a rate which could render its popular use practicable.

The following objections have been made to this light; namely, the increased expense of the double service pipes required, the want of diffusiveness in the light, which, although powerful, as we have stated it to be, is asserted to penetrate, rather than illuminate the surrounding space to a great distance; and, lastly, the danger which would attend the introduction of inodorous explosive gases into dwellings.

The expense of the service pipes is by no means a serious objection, as the cheapness of the light—if we accept the statements of those best informed in regard to it—will render the introduction of the service a very profitable investment.

The want of diffusiveness is an objection which only applies to the lighting of streets, squares, and parks; and we have shown in a previous article, that this most probably arose, in the trial of this light in London, from placing it too low down. Any light requires for its proper diffusion a refracting and reflecting medium, and it would be easy to show by a diagram that the lower a light is placed the more of its rays will reach the ground and be absorbed without the possibility of reaching to remote distances.

The objection made by the English journals in regard to the danger of introducing these gases into dwellings, will be found to vanish upon even a superficial examination.

Oxygen and hydrogen mixed in the proper proportions are violently explosive. So is a mixture of common illuminating gas and air, nevertheless the gas now in general use is admitted to be the safest illuminating material ever generally adopted. But the latter has so strong an odor that it cannot escape even in small quantities, without being detected. It would not be difficult to mingle with the oxygen some odoriferous gas which would be wholly consumed in the ordinary course of burning, and the presence of which would evidence any leak in the oxygen pipe. The street gas pipe would, as now, betray any leaks by the odor. Lastly, that any explosion may take place, both pipes must simultaneously leak at approximate points—a contingency so remote that it does not seem very frightful. We believe these gases may be carried into buildings with perfect safety, and that the increased purity of the air in rooms lighted by this method would be alone a full compensation for all its drawbacks real and imaginary.

We were present at an exhibition of this light at the works of the Oxygen Gaslight Company, in Forty-first street, in this city, on the evening of September 15th. Several experiments given by Prof. Doremus illustrative of the practical value of this light for public and private use. We were a little surprised and much pleased to see so complete an establishment, upon which has been already expended, we were informed, one hundred and twenty-five thousand dollars.

It appears to us that a new light is about to break upon this benighted world—certain it is that the time has come when some advance in the method of artificial illumination is imperatively demanded, and we certainly see no valid reason why this improvement cannot be generally adopted.

A New and Destructive Torpedo.

The United States flagship *Franklin*, with Rear-Admiral Radford on Board, is at present in the Adriatic to test the qualities of the newly-invented torpedo, the story of which once appeared in this journal. The inventors of the machine claim for it, says the *Pall Mall Gazette*, a superiority over all other torpedoes now in use. First of all, it is a mere mine, to be exploded whenever chance may present a fitting occasion. It is a projectile which can be directed with an unerring accuracy against the object to be assailed, and this at a distance of several hundred yards. Secondly, it can be projected at any depth below water that may be required; thirdly, its explosive power is such as to make the strongest ironclads now afloat as much at its mercy as any wooden ship; and lastly, the line of its direction may be made to curve or zig-zag, so that it can be used with safety in the immediate proximity of friendly vessels.

As the United States Navy have lately embodied a special corps, chiefly for coast defenses, entitled the Torpedo Brigade, in which some of the most scientific officers have taken service, it is not without importance to know that by these same "experts" the Fiume invention has been pronounced a complete success. They have tested the machine by a variety of experiments, and without a failure in any. The resistance of water at a certain depth to permit the downward course of a cannon shot, and the phenomena of "ricochet" have lately occupied great attention in the American Navy, so that, whether the present invention could fulfill the difficult condition of preserving a uniform course at a depth, say fifteen or eighteen feet below the surface, was a most interesting problem to them. To ascertain this, nets were sunk at different distances along the course the torpedo was to take, and staffs with a graduated measure attached to them. By the replaced meshes the passage of the projectile was tested, and in a course of many hundred yards found not to have varied more than a few inches.

Of course the principle of the invention is a secret, but the inventor—or, more properly speaking, the perfector of the invention—an English engineer, Mr. Whitehead, has no hesitation in saying that he derived his first suggestion of the discovery from the mechanism of the fish, and that the peculiar mechanism and functions of what is called the "swimming bladder," by whose agency the power to ascend or descend in water is secured, afforded him the first clue to his wonderful invention.

The machine is about sixteen feet long, shaped like a fish, propelled by a screw, and guided by a rudder, so that, seen in the clear water, as one of the experimentalists described, its apparent vitality and volition were positively horrifying. The Austrian Government, it is said, acting under the advice of Admiral Tegethoff, have purchased the use of the invention—the patent remains with the inventor—for £20,000. Our own government deputed a commission to examine and report on it, and, it is believed or rumored, with approval of its efficiency.

Dr. Tyndall's Theory of Comets.

Prof. Tyndall has developed a cometary theory out of his late researches upon the actinic power of light. It will be remembered that he has found that a beam of light is capable of forming a bright glowing cloud in its course through a space containing a modicum of vapor, the said cloud being first reduced by the chemical action of the light, and then rendered visible by illumination of the condensed particles.

The application of this principle to the explanation of cometary phenomena is as follows: A comet is held to be a mass of vapor decomposable by the solar light, the visible head and tail being an actinic cloud resulting from such decomposition. The tail is not matter projected from the head, but matter precipitated on the solar beams which traverse the cometary atmosphere; nothing being carried from the comet to form the tail, but something being deposited from the interplanetary space through which the body is coursing. But this explanation supposes that the sunlight has a different power when it has passed through a vapory comet to that which it possesses when it has traversed no such medium; otherwise all space would be lit up like a comet's tail. To account for such a peculiar property, Prof. Tyndall assumes that the sun's heating and chemical powers are antagonistic, and that the calorific rays are absorbed more copiously by the head and nucleus than the actinic rays. This augments the relative superiority of the actinic rays behind the head and nucleus, and enables them to bring down the cloud which constitutes the tail. Thus the caudal appendage is in a perpetual state of renovation as the comets move through space; the old tails being dissipated by the solar heat as soon as they cease to be screened by the nucleus. Nearly all the phenomena observed in those mysterious bodies are accounted for by Dr. Tyndall. One, however, he has not mentioned; namely, the peculiar luminous envelopes, familiar to comet-gazers, which surround the nucleus like a series of cloudy glass cases. No theory can be called complete which does not account for those remarkable and evidently important features.

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The Andaman Monkey at the Zoological Gardens in London.

The discovery in the Andaman Islands of a new species of Quadrumana is a very important addition to our knowledge of this interesting country. One or two species of monkeys were known to exist on the adjacent Nicobar Islands, the common Macaque being one of them; but until Capt. Brown brought home the present individual no monkey was known to exist on the Andaman Islands. One or more species of monkey being found on the Nicobar Islands would lead us to expect such a thing highly probable, and had the same species of monkey been met with, nothing very remarkable would have been thought about it; but the discovery of a species hitherto unknown upon the islands that have already furnished us with a man and a pig that are quite unlike any of the neighboring races, is a circumstance deserving particular attention, and affords materials for much speculation and investigation.

This new and unique monkey has been presented to the Zoological Society by Capt. Brown, R. N., of Her Majesty's ship *Vigilant*. It dates its joining the ship's company, from Port Blair, Andaman Islands, in the Gulf of Bengal, lat. 11° 43′ N., long. 92° 47′ E., in the year 1864.

Jenny (for that is her name) is supposed to be eight or nine years old. For the last four years she has "served" on board the ship, and having passed all the dangers of the Abyssinian campaign and discharged with a first-class certificate and silver chain and medal for good conduct, is now waiting to receive her share of the prizes taken during the time she was in Her Majesty's service.

Jenny stands about 2 feet 4 inches in hight. In general appearance she is most like the "pig-tailed" monkey, but is at once distinguished from this species by a remarkable arrangement of the hair on the top of the head, which is somewhat of a V-shape, and is parted down the middle. The hair itself is very fine, and it is elegantly arranged round the ears. The first impression upon seeing this animal is that it is intermediate between *Macacus rhesus* and *Macacus nemestrinus*. The face is by no means fierce, the features may be even called good-natured. She has been made a great pet by the sailors, the result being that she has been educated to an extraordinary degree of cleverness. She is fond of company, and her constant companion is a chicken (a regular ship chicken, with hardly any feathers), which lives with her in cage day and night, and accompanies her in her perambulations. She walks upright on her hind legs with remarkable facility, and with much less effort than even the performing monkeys as seen in the London streets. When in an erect attitude she will carry things. Thus she will pick up her chicken and run about with it, holding it in her arms as a nurse does her child. The chicken does not seem to mind this in the least. At the word "Throw her overboard," Jenny throws the chicken smartly away from her.

It has been said that monkeys would talk, but that they know that if they talked they would be made to work. Now the Andamanian Jenny forms an exception to the "working" part (only that is very agreeable work) of the story, for if a soda-water bottle is given her she will set to work to untwist the wire. This done, she will get out the cork, if it be not too tightly fixed, and then drink the contents of the bottle. Her attitude in drinking is something quite new. She sits down on her haunches, holds the bottle with both hands, and tilts the end of it up with her hind foot, so that the liquid shall flow at the proper level into her mouth. In this attitude her appearance is most comical, and at the same time most interesting.

The most extraordinary part of Jenny's performances is that she smokes a pipe. Most monkeys will carry a pipe in their mouth and pretend to smoke, but this is the first monkey that we have ever known actually to smoke lighted tobacco out of a pipe.

Most monkeys will drink grog, but Jenny is especially fond of it, and she always takes her glass with her pipe, which she enjoys quite as much as Forecastle Jack after he has been reefing topsails. Our friend Mr. Buckland has called to see Jenny; the fair Andamanian, devoid of shyness, repaid the compliments this gentleman offered her, in monkey language, by snatching a half-smoked lighted cigar out of his mouth, and did him the honor to finish it, throwing away the end when it threatened to burn her lips.

The Andaman natives are said to be the most degraded of human beings. If Jenny is an average sample of the monkeys, we would sooner be a monkey than a man, if nature had cast our lot in the far distant Andaman Islands.—*A. D. Bartlett in "Land and Water."*

Canadian Boulder Rocks.

At a recent meeting of the Geological Society of London, a communication was read on the Geology and Mineralogy of Hastings county, Canada West, by T. C. Wallbridge, Esq., describing the gold and iron ores. A single boulder near the Shannonville railway station was said to cover an area of about five acres, and to have a thickness of 100 feet.

Prof. Ramsay inquired as to the proof of the existence of so large a boulder as one of five acres in extent. Under ordinary circumstances large boulders fell from higher rocks on to the surface of glaciers beneath, and were by them transported to the places where now found; but the fall of such a mass seemed almost incredible. He suggested that possibly it might be an outlier of the lower laurentian beds. Mr. David Forbes stated that the results of his own examination of some of the specimens from the gold mines in this district did not quite tally with those recorded in the paper, especially those of the rocks in the neighborhood of the veins. He considered that the gold in Canada was confined to the veins. Mr. Prestwich cited the discovery of a boulder between Stamford and Peterborough, which was at least 400 feet in length, and consisted of a mass of great oolite. Mr. Searles Wood mentioned a boulder of marl in the coast section near Cromer, upwards of 300 yards in length, and sixty feet in hight. Mr. Wallbridge, in reply, stated that the rock must have come at least twenty miles from its original home. The surface of the Trenton limestone rock in the neighborhood was striated in the direction of the boulder. There was no evidence of intrusion. The mass was traversed in two or three places by crevices.

WE are under special obligation to correspondents, who from time to time, furnish letters for publication in our columns upon a great variety of practical topics. We highly value these contributions, and hope that our mechanics will oftener take the pen and contribute from their valuable store of practical information. The warmer season has passed away, and we are getting into the working harness once more for active work. During the coming months we hope to enrich our columns with a greater variety of practical subjects, and shall look for an increased number of useful contributions from our readers.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

Professor Henry Morton, of Philadelphia, has been elected to the newly-created Professorship of mechanics, in the University of Pennsylvania.

The recently discovered gold mines in the Hoosaympa district have been opened, and large parties of miners are among them from White Pine.

Several mechanics in Colt's armory, at Hartford, have contracted to go to Russia to make guns for that Government. They will get more pay there and expect to live cheaper than here.

An extensive ledge of feldspar has been discovered at Georgetown, Me. As it is valuable for the manufacture of porcelain measures are to be taken to have it thrown into the market.

The business of canning sweet corn has begun in Maine. Millions of cans will be put up in the State, though the yield of corn for the purpose is much below the average in amount per acre.

It is said that a little carbolic acid dissolved in the water used to moisten a whetstone, or a grindstone, will greatly increase the friction and promote the action of the stone upon the steel instrument.

A Berlin dispatch states that the Federal Telegraph Administration of the North German States will hereafter forward all messages for America by way of Valentia, owing to the "restrictions" of the French Atlantic Cable Company.

A law has been passed in the Netherlands canceling the old patent law of 1817, and, consequently, abolishing patents for inventions there. Though all existing patents remain in force, no new ones have been granted since the 1st day of August, 1869.

Les Mondes learns with pleasure that the directors of the Transatlantic French Steam Navigation Company have entered into a contract for supplying to their vessels, magneto-electric machines and other requisite apparatus for exhibiting on board, during the night-time, electric lights as signals.

A man digging a well in Ohio was overcome by the gas and dropped insensible. A brave Welsh woman saw what had occurred, and taking a handkerchief saturated with camphor, went into the well and spread it over the man's face, fastened a rope round his body, and then returning to the surface pulled him out and nursed him until he recovered. She did all the work unaided and alone.

A Pomological Congress of the United States is to meet at Philadelphia, and there will be given at the same time at the Horticultural Hall, a national exhibition of the fruits of America. All the states of the Union, says the *Press*, will be represented by the best specimens their orchards and gardens and woods can send. It is expected that a display of ten thousand dishes of rare and choice fruit, apples, pears, grapes, and berries, will be made.

The preparatory surveys of the canal from the North Sea to the Baltic, are at present terminated. The work is not to be intrusted to a private company, as was at first contemplated, but is to be executed at the cost of the State. The cost is estimated at thirty millions of thalers. Branch canals are to be united to the main line in order to increase its commercial value. The date at which operations will commence is not yet fixed, but it is not expected that it will be available for large vessels before six or eight years.

The new earth dams of the Kohanzie water works, at Danbury, Conn., are carefully constructed. Pure water will be secured by an arrangement for taking the supply from the surface of the pond. This is a tower, built of stone outside and of brick inside. The water will pass into this at the surface, and then into the supply pipe. It has been demonstrated that the impurity existing in the Kohanzie water during the summer months is confined to the bottom of the pond, and water obtained from the surface is free from it.

Few are able to give a satisfactory account of what becomes of their old shoes after having committed them to the dust heap. *Cosmos* has been looking into the question, and has found out that many of thrm are cut up into small pieces and put for a couple of days into chloride of sulphur. The leather has become hard and brittle about the end of that period, and is withdrawn from the action of the chloride of sulphur, washed with water, dried, and ground to powder. The powder is mixed with shellac or some good glue, and is pressed into molds and formed into combs, buttons, knifehafts, and other useful articles.

Mechanical Engravings,

Such as embellish the SCIENTIFIC AMERICAN, are generally superior to those of any similar publication, either in this country or in Europe. They are executed by our own artists, who have had long experience in this branch of art, and who work exclusively for us. There is one pertinent fact in connection with the preparation and publication of an illustration in our columns, that needs to be better understood by inventors and manufacturers who often pursue a short-sighted policy in bringing their improvements to public notice. They go to a large expense in printing and circulating handbills, which few care either to read or preserve. Now, we undertake to say, that the cost of a first-class engraving, done by our own artists and printed in one issue of the SCIENTIFIC AMERICAN, will amount to less than one-half the sum that would have to be expended on a poorer illustration, printed in the same number of circulars, and on a sheet of paper in size equal to one page of our journal. A printed handbill has no permanent value. Thousands of volumes of the SCIENTIFIC AMERICAN are bound and preserved for future reference—beside, we estimate that every issue of our paper is read by no fewer than one hundred thousand persons. Parties who desire to have their inventions illustrated can address the undersigned, who are also prepared to send artists to make sketches of manufacturing establishments, with a view to their publication in the SCIENTIFIC AMERICAN For particulars address

MUNN & CO.,
37 Park Row, New York.

How to Get Patents Extended.

Patents can be extended, for seven years, under the general law, but it is requisite that the petition for extension should be filed with the Commissioner of Patents, at least ninety days before the date on which the patent expires. Many patents are now allowed to expire which could be made profitable under an extended term. Applications for extensions can only be made by the patentee, or, in the event of his death, by his legal representative. Parties interested in patents about to expire, can obtain all necessary instructions how to proceed, free of charge, by writing to

MUNN & CO., 37 Park Row, New York.

NEW PUBLICATIONS.

PEAR CULTURE FOR PROFIT. By P. T. Quinn, Practical Horticulturist. New York: The Tribune Association, 154 Nassau street.

This little work contains a large amount of useful information in regard to the cultivation of the different varieties of pears, from the preparation of the soil for a pear orchard to the harvesting of the fruit. It gives also full directions for transplanting, and for judging of the adaptability of the various kinds to peculiarities of soil climate, etc., etc. Probably no kind of fruit grown in this country depends more for success upon intelligent cultivation than the pear; and many of the failures heretofore attending its cultivation are mainly to be attributed to the lack of just the knowledge this book supplies. No branch of horticulture can be made more profitable than this, with proper management, and this treatise will be the means of putting those on the high road to success who, having gone astray have hitherto met with discouraging results.

APPLICATIONS FOR EXTENSION OF PATENTS.

GIMLETS.—Chester C. Tolman, of Shelburne Falls, Mass., has applied for an extension of the above patent. Day of hearing November 22, 1869.

CLOTH-STRETCHING ROLLERS.—Seth Simmons, of Providence, R. I., administrator of the estate of Nathan Simmons, deceased, has petitioned for an extension of the above patent. Day of hearing, November 22, 1869.

BUCKLES.—Stephen E. Booth, of Orange, Conn., administrator of the estate of Sheldon S. Hartshorn, deceased, has petitioned for the extension of the above patent. Day of hearing, November 29, 1869.

TREATING OILS.—Philo Marsh, of South Adams, Mass., has petitioned for the extension of the above patent. Day of hearing, December 13, 1869.

SLIDE VALVES.—James Cochrane, of New York city, has petitioned for an extension of the above patent. Day of hearing, December 13, 1869.

WRENCHES.—William Baxter, of Newark, N. J., has applied for an extension of the above patent. Day of hearing January 24, 1870.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuito us replies to questions of a purely business or personal nature. We will publish such inquiries, however when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

L. W., of Mo.—You may determine the variation of the magnetic needle by the following formula: To the log. secant of the latitude (rejecting the index), add the log. sine of the sun's declination, corrected for time and place of observation; the sum will be the log. sine of the true amplitude, to be reckoned from the east in the morning or the west in the afternoon, and towards the north or south according to the declination. Then if the true and magnetic amplitudes be both north or both south, their difference is the variation, but if one be north and the other south, their sum is the variation. To determine whether the variation be to the west or east, suppose yourself looking toward the point of the compass representing the magnetic amplitude. Then, if the true amplitude be to the right of the magnetic amplitude, the variation is east, and *vice versa*. You may also determine it by first reducing the sun's declination to the time and place of observation and computing the true altitude of the sun's center. Second, substract the sun's declination from 90 degrees when the latitude and declination are of the same name, or add it to 90 degrees when they are of contrary names. The remainder, or the sum, will be the sun's polar distance. Third, add together the sun's polar distance, the latitude of the place, and the altitude of the sun. Find and reserve the difference between half this sum and the sun's polar distance, and to the log. co-sine of the difference thus found, add the sum of the log. secant of the altitude, the log. secant of the latitude, and the log. co-sine of the half sum of the sun's polar distance, the latitude, and the sun's altitude (rejecting indices). Half the sum of these logarithms will be the sine of half the sun's true azimuth. Then if the true and observed azimuths be both on the east, or both on the west side of the meridian, their difference is the variation, but if on opposite sides of the meridian their sum is the variation.

J. S. G. Jr., of D. C.—The black sand you send contains iron ore to which your magnetized knife blade adheres. Its presence is not a special indication of valuable ores. The earths you speak of are species of clays, and the colors are due to the presence of various mineral substances in small quantities. On the line of the Baltimore and Washington Railroad there are fine examples of these colored earths; also on the Philadelphia & Baltimore roads. The earth that you speak of as hardening by exposure to the atmosphere is found in various places.

J. G. P., of Pa.—In a drying loft heated by a system of steam pipes on the floor, and in which a constant circulation of air is to be maintained, the air should be admitted through registers in the floor. In your case parallel openings, one inch in width, in the floor between the parallel pipes, would be best, with ventilators at the top to render the circulation as diffused as possible. These ventilators had better be numerous, small and well distributed than few and large.

L. H. W., of D. C.—The amount of borax put into water may be largely in excess of that needed for laundry purposes. Its alkaline reaction is too feeble injure the fiber of linen, cotton, or woolen textures. We do not now recollect any book containing the precise information you seek in your other queries. You had better address a letter of inquiry to Henry Carey Baird, Industrial Publisher, Philadelphia, Pa.

G. C. B., of Conn.—To take plaster of Paris casts of medals, wood-cuts, etc., you must oil the object, the impression of which you wish to obtain. Then place it, face upward, in a box or other appliance, to keep the plaster from running off while soft. Next mix rapidly the plaster with water to the thickness of cream, pour it on the mold and let it harden, which it will do in a short time.

W. B., of N. Y.—Mere motion in air has the effect to heat it rather than to cool it. It is only when the motion mixes colder air with heated air that the motion has anything to do with the cooling. The heating and cooling of air are subject to the same laws as govern the heating and cooling of all other fluids.

G. S., of Ill.—We have tested the alcohol and camphor barometer pretty thoroughly this summer, and have found it wholly unreliable. We have not much faith in any barometer as a mere weather indicator.

R. M. A., of Mass.—You need not fear any ill effects in your boiler, piping, or engine, from the blasting powder detritus, left in the well you are digging, after one or two thorough rinsings.

W. P. A., of Mass.—The information you seek cannot be given in the space we can allot you. Dussauce's "Treatise on Tanning," published by Henry Carey Baird, of Philadelphia, Pa., contains it in full.

P. J., of N. Y.—Pure gold is very malleable and in that sense plastic. When properly manipulated almost any form can be given to it without the use of heat or the aid of any solvent.

S. W. P., of N. Y.—The hair dressing of which you inquire is made of alcohol one pint, pure glycerine two ounces, and pure water one half pint. Scented to suit taste.

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Indorsement of the Great Western Improved Advertising Company.

The following is one of many similar indorsements received by this Company:

PRINCIPAL OFFICE WILSON'S S. M. Co.,
CLEVELAND, OHIO,
August 30, 1869.

Sitwell Harris, Esq., Manager Great Western Improved Newspaper Advertising Co., St. Louis. Mo.:

SIR:—In compliance with your request, I cheerfully certify, that during the past year and a half, we have done a large amount of advertising through your agency, and our contracts, embracing over two hundred papers, have been carried out to our entire satisfaction.

Yours truly,
W. G. WILSON,
President Wilson S. M. Co.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Green lumber dried in two days. Also, tobacco, meal, and every substance, cheaply. Circulars free. H.G.Bulkley, 135 Fulton st., New York.

Send or Agents' Circular—Hinkley Knitting Machine Co., 176 Broadway.

Wanted at once—The address of agencies for the sale of Patent Rights. Moyen & Jones, Gordonsville, Va.

Beck's Vise Challenge—see page 175, Vol. 21.

Two inventions for sale.—N. F. P., Box 182, Paterson, N. J.

Manufacturers of Power-Hoisting Machines, send to M. W.W., Lock Box 47, Reading P. O., Pa., descriptive Circular with prices.

$5 to $25 per day to Agents, Male and Female. Send 15c. to Taylor & Nye, Stamford, Conn., for circular and sample of liquid silver for replating spoons, forks, castors, etc., and instantaneously silver plating all articles of brass, copper, etc., etc.

To Jewelers.—Situation wanted by an experienced jeweler and engraver. Address Box 43, Pontiac, Mich.

Liberal inducements offered to manufacture the best skate in existence. Just Patented. Address O. H. Castle, Urbana, O.

Cut-off saw wanted to cut off shingle blocks 3-ft. long. The engine in use is 40-H. P. Address J. C. Bowman, Pickens Station, Miss.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

The Best and Cheapest Boiler-flue Cleaner is Morse's. Send to A. H. & M. Morse, Franklin, Mass., for circular. Agents wanted.

Wanted—A contract for the manufacture of specialties, either hardware or tools. C. N. Trump, Machinist, Portchester, N. Y.

Man'f'rs of grain-cleaning machinery and others can have sheet zinc perforated at 2c. per sq. ft. R. Aitchison & Co., 845 State st., Chicago.

Wanted—To communicate with any party who has a practical knowledge of building and running a powder mill. Address "W," P. O. Box 5,692, New York city.

Send for a circular on the uses of Soluble Glass, or Silicates of Soda and Potash, fire and water-proof. Manufactured by L. & J. W. Feuchtwanger, Chemists and Drug Importers, 55 Cedar st., New York.

Minn. State Fair.—To Advertisers. Send for Circular to Post, Rochester, Minnesota.

S. S. Pollard's celebrated Mill Picks, 137 Raymond st., Brooklyn.

Materials for all Mechanics and Manufacturers, mineral substances, drugs, chemicals, acids, ores, etc., for sale by L. & J. W. Feuchtwanger, Chemists, Drug, and Mineral Importers, 55 Cedar st., New York. Postoffice Box 3616. Analyses made at short notice.

Mill-stone dressing diamond machine, simple, effective, durable Also, Glazier's diamonds. John Dickinson, 64 Nassau st., New York.

Leschot's Patent Diamond-pointed Steam Drills save, on the average, fifty per cent of the cost of rock drilling. Manufactured only by Severance & Holt, 16 Wall st., New York.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Machinists, boiler makers, tinners, and workers of sheet metals read advertisement of the Parker Power Presses.

Diamond carbon, formed into wedge or other shapes for pointing and edging tools or cutters for drilling and working stone, etc. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

For sale by State or County the Patent Right for the best Cultivator in use. For terms address Isaiah Henton, Shelbyville, Ill.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

PLOW.—N. Robinson, Patchogue, N. Y.—The object of this invention is to prevent the plow from choking, when plowing in stubble, manure, etc.

BURNERS FOR COAL OIL, ETC.—E. D. Boyd, Helena, Arkansas.—The object of this invention is to provide a simple and cheap perpetual wick for lamps.

HOT OVEN.—D. and J. Campbell and S. Raymond, Middletown, Pa.—This invention relates to that class of furnaces or ovens employed to heat air for the blast of hot-blast furnaces.

KEROSENE BURNER.—James R. Cole, Demopolis, Ala.—The object of this invention is to prevent the danger of explosions arising from the heating of the wick tube, and the generation of gas in the upper part of the lamp.

LIGHTNING RODS.—W. S. Reyburn and F. J. Martin, Philadelphia, Pa.—This invention consists in making a section of a lightning rod of one piece of sheet metal, doubled upon itself in ribs, in a peculiar manner, whereby a very excellent rod is produced at a very cheap rate.

VELOCIPEDE BOAT.—G. Haberland, Pontiac, Ill.—The object of this invention is to provide for public use a velocipede boat, so constructed and arranged that the driver can conveniently propel and steer it, while it is light capacious, safe, and commodious.

SASH BALANCE.—J. G. Jones, Baltimore, Md.—This invention relates to that class of sash balances in which a coiled spring is employed, and consists in a novel arrangement of such spring with the cord pulley, and a couple of small spur wheels, whereby the mechanism operates more smoothly and uniformly, while a smaller spring is required.

COMBINED SECTION MARKER AND ROLLER.—Elihu Evans, Denver City, Colorado.—This invention consists in a new arrangement and combination of section rollers and section markers, in a single instrument, to be employed on plowed ground in rolling the surface and laying off well-defined drills or channels, at any required distance apart, into which the agriculturist can lead water, and thereby distribute it uniformly over the field for the purpose of irrigation.

MELODEON.—J. R. Cluxton, Russellville, Ohio.—This invention comprises two important improvements in melodeons and other instruments of a similar character. 1st. The volume of sound from each key is made to depend upon the pressure of the finger upon that particular key, so that pedals, stops, swells, etc., may be entirely dispensed with, and the loudness or softness of each sound be regulated with the utmost nicety by the touch of the player. 2d. A vibrating box, sounding board, and sounding posts are employed to increase the resonance of the instrument and soften and improve the quality of its tones.

COMBINED HAY RAKE AND LOADER.—Francis Terwilleger and John R. Isdell, Wyanet, Ill.—This invention has for its object to furnish a machine, simple in construction, and effective in operation, by means of which the hay may be collected and loaded upon the hay rack as the wagon is drawn forward.

COMBINED PLOW AND SCRAPER.—J. Reynolds, Crystal Springs, Miss.—This invention has for its object to furnish an improved scraper for plowing and scraping cotton and corn, and which shall be simple in construction, effective in operation, and easily operated.

CHURN.—James King, Suckasunny, N. J.—This invention has for its object to furnish an improved churn, which shall be so constructed that it may be conveniently nested for market or transportation.

FURNACE.—Wm. A. Madara, Spang's Mills, Pa.—This invention has for its object to furnish an improved device for regulating the stock or fuel ore and flux, so that they may pass down properly mixed, preventing the heavier parts from sliding down in the middle and pushing the fuel or lighter parts to the side, and which will prevent clogging, relieve the hearth from much of the weight, allow the blast to pass through more freely, and keep the furnace working cool in its upper part.

RAILROAD TRACK.—C. G. Wilson, Brooklyn, N. Y.—This invention has for its object to improve the construction of railroad tracks, so as to make them stronger, smoother, more durable, safer, and more easily and cheaply kept in repair than when constructed in the ordinary manner.

HAIR CUTTER.—George A. Harley, New York city.—This invention has for its object to furnish an improved instrument for cutting or "shingling" the hair of the human head, which shall be simple in construction and effective in operation, enabling each man to do his own hair cutting, if desired.

HAY LOADER.—J. G. Sehorn, Iowa City, Iowa.—This invention has for its object to furnish an improved device, designed especially for loading hay upon a wagon rack, but which shall be equally applicable for loading manure, dirt, and other heavy weights, and which shall, at the same time, be simple in construction, easily operated, and effective in operation.

PICKET FENCE.—H. N. Hill, Pontiac, Mich.—This invention relates to a new picket fence, which is so constructed that it can be easily and cheaply made, and that it will be strong and durable.

SEWING MACHINE.—Francisco B. Contessa, New York city.—This invention relates to a new and useful impovement in sewing machines, whereby they are adapted for performing certain kinds of work in a better manner than such work has been done heretofore.

PAPER PULP ENGINE.—Peleg Rose, Norwich, Conn.—This invention relates to a machine called a "paper pulp engine," for reducing rags, and other paper stock, to a pulp for the manufacture of paper.

ARRANGING GEARING.—T. Salisbury, Albion, Pa.—This invention relates to a new and useful improvement in arranging gearing for driving agricultural machinery, and for other purposes.

WATER WHEEL.—Joseph Hathaway, Woodstock, Vt.—This invention relates to a new and useful improvement in car wheels, whereby many of the objections to the ordinary arrangement of the shutes and parts connected therewith are obviated.

WROUGHT-IRON MOLD FOR VULCANIZING RUBBER CAR SPRINGS, ETC.—Charles H. Franklin, Jersey City, N. J.—This invention relates to a wrought-iron mold for vulcanizing rubber car springs, etc.

COFFEE ROASTER.—Adolph Cohn, Louisville, Ky.—This invention relates to a new device for roasting or parching coffee, or malt, and has for its object simplicity of construction, rapidity of action, and economy of fuel.

AUTOMATIC DISENGAGING APPARATUS.—John H. Kingsland, New York city.—This invention relates to a new automatic disengaging apparatus, which is more particularly applicable to suspend ships boats from their davits and to release them as soon as they reach the water, but which may also be used for other purposes.

CHURN.—J. H. Wildasin and J. A. Peek, St. Charles, Iowa.—This invention consists in the application to the lower half of a cylindrical case made in two parts, and having a rotary beater working therein, of an auxiliary semicircular case with a perforated bottom, through which the buttermilk may be drawn off after the butter is formed, to facilitate gathering and solidifying the same.

AXLE BOX.—James B. Hendricks, Clayton, Ill.—This invention relates to a new axle box for carriages, buggies, and all other wheeled vehicles which have stationary axles, and has for its object to produce simpler and more durable supports for the wheels than were heretofore provided.

MATCH SAFE.—Hiram Richmond, West Meriden, Conn.—This invention consists in so forming the back of one piece, and the front sides and top of another piece, by casting, of any prepared metal, that when placed in position together for securing by screws or rivets, coincident recesses formed in each, or recesses in one and projections in the other part, will constitute bearings for the doors, which are made self-closing by weighting one side.

LAMPWICK ADJUSTER.—Wm. F. Rippon, and George A. Johnson, Providence, R. I.—The object of this invention is to provide an adjustable spring presser, for use in lamp wick tubes for regulating the breadth of the wick passage in the said tubes according to the wicks, which vary materially in thickness.

TORPEDO.—James Dickey, Venango City, Pa.—The object of this invention is to provide a torpedo which affords an instantaneous and explosive effect, thereby acting upon the surrounding media with a more instaneous concussive effect.

BEEFSTEAK CRUSHER.—Horace Thompson, Concord, N. H.—This invention relates to a new beefsteak crusher, which is so constructed that it will cut entirely through the fibers of the meat, without separating the same, thereby making the steak tender and palatable.

HAY RAKE AND LOADER.—Andrew Sheline, Edon, Ohio.—The object of this invention is to provide a simple and efficient hay raking and loading apparatus, for attachment to a wagon, so that while being drawn along behind the wagon it will gather up the spread hay and deliver it up to the said wagon.

CALCULATING MACHINE.—John Hermann Rudolph Reffett, Hoboken, N. J.—This invention has for its object to provide an apparatus, by means of which either one of the four rules of arithmetic, namely, addition, subtraction, multiplication, and division, can be successfully exercised for practical and educational purposes. The invention consists chiefly in the arrangement of a disk, or turn table, working between two slotted disks or plates, and carrying a system of figures and dots, or apertures, by which the required calculating systems are most effectually produced. The inventor is desirous of disposing of state and county rights, or to sell the whole patent, which is dated Sept. 14, 1869.

WASHING AND WRINGING MACHINE.—Orin Skeel, Winslow, Ill.—This improvement comprises an arrangement of grooved rubbing rollers on a spring bed in the bottom of the tub; also, in conjunction therewith an arrangement of grooved rollers on a hinged frame above the first-mentioned rollers, between which two sets, the clothes are drawn back and forth by turning the upper rollers, first one way and then the other, by means of a crank and suitable connecting gears. The said improvement also comprises a wringing attachment to the hinged frame, under an arrangement whereby it is operated by the same crank that works the grooved rollers.

ORE GRINDER.—Samuel Stephens and J. W. V. Rawlins, Houghton, Mich.—The object of this invention is to provide a simple and efficient machine for grinding ores. It consists of an arrangement of crushers or grinders suspended adjustably from a revolving plate, so as to project into a tub or mortar, into which the ore is fed in a peculiar way.

PLANTER AND CULTIVATOR.—A. J. Misenhimer, Oskaloosa, Ill.—The object of this invention is to provide a planting attachment for cultivators which may be readily applied to or detached from the cultivator, and to provide a simple and efficient arrangement of the same planting attachment.

MACHINE FOR MAKING CLOTHES PINS.—A. J. Ockington, Stratford Hollow, N. H.—The object of this invention is to provide a simple and efficient automatic machine for receiving the turned blanks from one or more lathes sawing the said blanks, which are long enough for three or more pins, and slotting and delivering them.

HARROW.—J. H. Williams, Tontzville, Kansas.—This invention consists in constructing the two branches of a triangular harrow in short sections, overlapping each other, and pivoted together, so as to oscillate freely in vertical planes, and provided with strengthening links connecting each pivot bolt.

WATER REGULATOR.—Xavier Amoun, Sidney, Ohio.—This invention relates to improvements in water regulating apparatus for the supply pipes of cisterns, etc., and has for its object to provide a simple arrangement of regulating valve to be operated by a float to close the inlet passage, and turn on the water into an escape pipe when the cistern is sufficiently full and to open again and admit the supply when the water falls in the cistern, and designed more especially to be used in cisterns which are supplied from the eaves of houses,

A NOVELTY IN MUSICAL INSTRUMENTS.—The number of inventions applied to musical instruments during the last decade has been very large but these inventions have been in the nature of improvements upon existing instruments; and a new musical instrument, worthy of the name, has not appeared in the last twenty-five years. This is an age of progress, however, and this wide and hitherto unworked field has been entered at last. Mr George Herrick, of Waverly, New York, has invented and just secured a patent for a musical instrument which promises to create considerable excitement in the musical world, and bids fair, the inventor thinks, to introduce a formidable rival to the piano to the music-loving public. The invention consists in connecting a key-board, like that used for an organ or piano, with a series of steel tongues like those used to produce the tones in a music box, through certain mechanical means (which cannot be easily shown without the aid of several drawings of the instrument), thereby placing the tones of the instrument at the will of the performer as completely as they are in the piano. Any one acquainted with the rich, full tones, unequaled for clearness and sweetness, of the best music boxes, may wonder why this instrument has not been invented before. This music has long been highly prized, some of the best music boxes commanding fabulous prices, but they have never come into general use; partly because of their high price, partly on account of their delicate machinery and its liability to get out of order, but chiefly because they were mere machines, playing only a stereotyped number of pieces. The invention of Mr. Herrick is intended to enable one to have an instrument possessing all the advantages of a music box with none of its defects. In a large instrument its range of tones is declared to be unequaled, and in power unsurpassed by any instrument, unless it be the pipe organ. In the higher notes of the scale its tones are of that clear dulcet quality found in no other instrument. In the lower register, tones can be produced lower on the scale (but still clear and full) than by any other means than the large pipes of the organ. Finally, it will have the great advantage of not getting out of tune. For these reasons it is believed that this instrument will be a very popular one.

VELOCIPEDE.—M. L. Rood, Denver, Colorado Territory.—This invention relates to a new three-wheeled velocipede, which is so constructed that it can be propelled by a convenient motion of the feet or hands, readily steered and stopped, and that it will accommodate two riders at once.

DETACHING SHIPS' BOATS.—Chas. H. Nye, Vineland, N. J.—The object of this invention is to provide an effective means of detaching ships' boats when suspended over the side of the vessel by davits or cranes.

STEAM GENERATOR.—Levi S. Ives, Pittsburgh, Pa.—The object of this invention is three-fold, namely: 1. To separate from the feed water all mineral and organic matter in solution and suspension, thereby preventing in crustation of the boiler; 2. to heat the feed water to the same temperature as that in the boiler before it is thrown upon the heating surfaces and 3d, to prevent priming or foaming.

FURNACE FOR STEAM GENERATORS, ETC.—M. Tildesley and James Bird, Willenhall, England.—This invention has for its object the construction of furnaces, stoves, and fireplaces generally, in such manner that the air may come in contact with the fire, and a draft may be created upon all sides of the fire, at the back end, and at the bottom or under the fire, the top alone being closed, by which construction we obtain smoke-consuming fires.

FLAX BRAKES.—James Boyce, Wooster, O.—The object of this invention is to provide in combination with the "Sanford and Mallory" flax brake a feeding attachment whereby crossed and tangled stalks may be in a great measure straightened and arranged in the proper order for feeding into the said brake in the required lengthwise position.

SIDE SADDLE.—John T. Gathright and John C. Freeman, Louisville, Ky.—This invention consists in a seat of peculiar construction and application of the same to the side bars or pads usually employed, the said seat being made of thin wood and pressed into the proper shape to comprise the cantel seat proper, back and fore springs of the off horn and the support for the near horn.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING SEPT. 14, 1869.

Reported officially for the Scientific American.

SCHEDULE OF PATENT OFFICE FEES:

On each caveat	$10
On filing each application for a Patent (seventeen years)	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On an application for Design (three and a half years)	$10
On an application for Design (seven years)	$15
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94,693.—POTATO DIGGER.—G. W. Adams and J. R. Hopper, Rochester, New York.
94,694.—RAIN WATER CUT-OFFS FOR CISTERNS.—Xavier Amoun, Sidney, Ohio.
94,695.—SWEETMEAT.—François Aroud, Lyons, France.
94,696.—DITCHING MACHINE.—Caleb Bartholomew, Ætna, New York.
94,697.—LEATHER HOLDER.—Christian Bates, Conestoga, Pa.
94,698.—CORN MARKER.—Joseph Bearden, Bath, Ill.
94,699.—SLED RUNNER.—W. N. Berkeley, Cedar Rapids, Iowa.
94,700.—BASE BURNING FIRE-PLACE HEATER.—B. C. Bibb, Baltimore, Md.
94,701.—SPRING BED BOTTOM.—H. E. Bissell, Hartford, Conn
94,702.—SAW CLAMP.—B. Blackstone, Warren, Ill.
94,703.—CLOTHES DRYER.—J. M. Blake, Buffalo, N. Y.

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94,704.—Mode of Preserving Wood.—V. W. Blanchard, Bridport, Vt.
94,705.—Harvester Cutter.—Henry Bonholtzer and J. S. Shopp, Cumberland county, Pa.
94,706.—Flax Brake.—James Boyce, Wooster, Ohio.
94,707.—Lamp Wick.—E. D. Boyd, Helena, Ark.
94,708.—Animal Trap.—Julius Branch, Mooers, N. Y.
94,709.—Hot Blast Oven.—David Campbell, Joseph Campbell, and Seymour Raymond, Middletown, Pa.
94,710.—Wrench.—Luke Chapman (assignor to the Collins Company), Collinsville, Conn.
94,711.—Toilet Mirror.—G. H. Chinnock, New York city.
94,712.—Toilet Mirror.—G. H. Chinnock, New York city.
94,713.—Melodeon.—J. R. Cluxton, Russellville, assignor to himself and T. W. Gordon, Georgetown, Ohio.
94,714.—Composite Gas Retort.—John Cochrane, New York city.
94,715.—Globe Valve.—M. R. Colvin, Worcester, Mass.
94,716.—Vapor Burner.—Isaac Cook (assignor to himself and H. S. Hall), St. Louis, Mo.
94,717.—Clutch for Hydraulic Wheel Presses.—A. B. Couch, Worcester, Mass.
94,718.—Three-Horse Equalizer.—Giles Cramton, Marshall, Mich.
94,719.—Blind Fastening.—J. E. Cryer, Greenpoint, N. Y.
94,720.—Cloth Sponging Machine.—George Dayspring and Edward Fitzki, Washington, D. C.
94,721.—Mode of Transporting Ships over Land.—E. M. Deey, New York city.
94,722.—Vapor Burner.—J. R. De Mahy, New Orleans, La.
94,723.—Sled Clamp.—L. R. Dexter, Lancaster, N. H.
94,724.—Refrigerator.—J. J. Doepken, Lima, Ohio.
94,725.—Cultivator.—W. A. Dryden and J. M. Turnbull, Monmouth, Ill.
94,726.—Manufacture of Crucibles.—A. K. Eaton, Piermont, N. Y.
94,727.—Tubular Well.—Jacob Edson, Boston, Mass.
94,728.—Broom and Scraper.—D. Elliot (assignor to himself, E. Seely, and J. A. Holmes), New York city.
94,729.—Lunch Box.—M. G. Fagan, Troy, N. Y. Antedated September 4, 1869.
94,730.—Mashing Machine.—L. C. Field, Galesburg, Ill.
94,731.—Chair Seat.—L. W. Fleld, Camden, Ill., assignor to himself and D. H. Dinsmore, Potter, N. Y.
94,732.—Hydraulic Elevator.—Henry Flad, St. Louis, Mo.
94,733.—Spinning Top.—L. O. Franke, Baltimore, Md.
94,734.—Broom or Mop Holder.—H. L. Franklin and Eugene Clark Nashua, N. H.
94,735.—Door Bolt for Safes.—Owen Gallagher (assignor to himself and Andrew Bell), Boston, Mass.
94,736.—Artificial Marble or Plastic Material.—H. A. Garvey, Memphis, Tenn.
94,737.—Side-Saddle.—J. T. Gathright and J. C. Freeman, Louisville, Kentucky, (assignors to J. T. Gathright).
94,738.—Railway Switch.—Daniel Haldeman, Mahanoy City, Pa.
94,739.—Material for Covering Steam Boilers, Pipes, etc.—E. S. Hardy (assignor to himself and J. L. Lay), Buffalo, N. Y.
94,740.—Sewing Machine.—Luke Heery, Hinsdale, Mass.
94,741.—Tumbling-rod Cover.—John Heuermann, Davenport, Iowa.
94,742.—Air Escape Funnel.—H. F. Hildebrand, Baltimore, Md.
94,743.—Percussion Cap.—A. C. Hobbs, Bridgeport, Conn.
94,744.—Machine for Forming External Recesses in the Heads of Cartridge Shells.—A. C. Hobbs, Bridgeport, Conn.
94,745.—Machine for Forming Cartridge Shells.—A. C. Hobbs, and T. V. Boyden (assignors to the Union Metallic Cartridge Company), Bridgeport, Conn.
94,746.—System of Water Supplies for Cities.—Birdsill Holly, Lockport, N. Y.
94,747.—Safety Valve for Water Pipes.—Birdsill Holly, Lockport, N. Y.
94,748.—Automatic Regulating Valve.—Birdsill Holly, Lockport, N. Y.
94,749.—Hydrant.—Birdsill Holly, Lockport, N. Y.
94,750.—Valve for Steam Engines.—J. W. Hopkins (assignor to himself and W. H. M. Pye), Brooklyn, E. D. N. Y.
94,751.—Soil Tiller.—William Hunter and D. M. Hunter, Meadville, Pa.
94,752.—Drawing Frame.—O. P. Hussey, Nashua, N. H.
94,753.—Churn.—W. C. Kemp, Palmyra, Mo.
94,754.—Photographic Head Rest.—Wiley Kenyon, Crawfordsville, Ind.
94,755.—Bent Lever Balance.—R. G. Kimball, Albany, N. Y.
94,756.—Reversible Bit.—Jefferson Kindleberger and W. A. Arnold (assignors to "The Inventors' Association of San Francisco, Cal."), San Francisco, Cal.
94,757.—Flat Chain.—Chester King and S. P. Johnson, Cleveland, Ohio; said Johnson assigns his right to said King.
94,758.—Automatic Boat Detaching Apparatus.—J. H. Kingsland, assignor to J. O. Kingsland and J. W. Kelsey, New York city.
94,759.—Water Power.—A. S. Lineback, Stockton, Utah Territory.
94,760.—Picking Mechanism for Looms.—O. D. Lombard, Lowell, Mass.
94,761.—Burglar Proof Safe.—Wm. McFarland, Brooklyn, E. D., N. Y.
94,762. Bolt for Trunk Trays.—Robert McMurray, Washington, D. C.
94,763.—Steam Safety Valve.—G. F. Morse, Portland, Me.
94,764.—Gate.—Gershom Mott, Joshua Morris, Jr., and David Lupton, Big Run, Ohio.
94,765.—Warp Dressing Machine.—Moses Nelson, Taunton, Mass.
94,766.—Combined Watch Key and Key Ring.—William Patton and B. C. English, Springfield, Mass.
94,767.—Steam Generator.—Leonard Phleger, Philadelphia, Pa.
94,768.—Sash Balance.—W. H. Pilgrim, Allegheny City, Pa.
94,769.—Let Off Mechanism for Looms.—Wm. Potter and L. J. Lafountain, Lowell, Mass.
94,770.—Box Opener.—Nathan Purdy, Providence, Pa.
94,771.—Ore Grinder.—Joseph W. V. Rawlins and Samuel Stephens, Houghton, Mich.
94,772.—Calculating Machine.—J. H. R. Reffelt, Hoboken, N. J.
94,773.—Lightning Rod.—W. S. Reyburn and F. J. Martin, Philadelphia, Pa.
94,774.—Combined Plow and Scraper.—J. Reynolds, Crystal Springs, Miss.
94,775.—Match Safe.—Hiram Richmond, West Meriden, assignor to Charles Parker, Meriden, Conn.
94,776.—Lamp Burner.—W. F. Rippon and G. A. Johnson, Providence, R. I.
94,777.—Water Wheel.—R. R. Royer, Ephrata, Pa.
94,778.—Vapor Burner.—Edward Savage, Chicago, Ill.
94,779.—Steam Generator for Kitchen and other Purposes.—W. B. Scaife, Pittsburg, Pa.
94,780.—Lubricator.—Nicholas Seibert, Nevada, Cal.
94,781.—Steam Generator.—Thomas Shaw, Philadelphia, Pa.
94,782.—Hay Raker and Loader.—Andrew Sheline, Edon, Ohio.
94,783.—Railway-rail Fastening.—Edwin R. Shepard, Scranton, Pa. Antedated August 26, 1869.
94,784.—Clod-fender for Growing Plants.—Lewis H. Shular, Crawfordsville, Ind.
94,785.—Composition for Paving.—John W. Smith, Washington, D. C., assignor to himself and John J. Sulivan. Antedated July 31, 1869.
94,786.—Washing Machine.—Justus Smith, St. Louis Mo.
94,787.—Coffeepot.—Oscar F. Stedman, Westfield, N. Y.
94,788.—Scroll Water Wheel.—Seymour G. Steves, Ashville, N. Y.
94,789.—Permutation Lock.—T. J. Sullivan, Albany, N. Y.
94,790.—Post-hole Excavator.—Henry Sutliff, Waverly, N. Y.
94,791.—Hay Raker and Loader.—Francis Terwilleger and John R. Isdell, Wyanet, Ill.
94,792.—Street Scraper.—J. K. Thompson, Chicago, Ill.
94,793.—Furnace for Steam Generators.—Matthew Tildesley and James Bird, Willenhall, England.
94,794.—Stove-cover Lifter.—Sylvenus Walker, New York city.
94,795.—Flute.—Oscar J. G. Wardrum, Chicago, Ill.
94,796.—Lamp Burner.—Sylvester W. Warren, Boston, Mass., assignor to himself, George B. Parrott, and George G. Desmazes.
94,797.—Sizing for Paper Manufacturers and Others.—Zenas Crane Warren and Henry Carleton Hulbert, Brooklyn, N. Y., assignors to Henry Carleton Hulbert.
94,798.—Toilet Mirror.—George Wattis, New York city.
94,799.—Process of Rectifying and Refining Whiskey and other Spirits.—H. Webster, New York city.
94,800.—Tension Attachment for Spools.—Marcus Brown Westhead and Robert Smith, Manchester, Great Britain. Patented in England December 15, 1868.
94,801.—Boot and Shoe Machine.—John E. Wiggin, Stoneham, Mass.
94,802.—Churn.—J. H. Wildasin and J. A. Peek, St. Charles, Iowa.
94,803.—Clipping Shears.—John C. Wilson, Adam Walker, and John Foster, New York city.
94,804.—Purchase for Hoisting and Lowering Top-masts of Vessels.—Wm. Winchester, Portland, Me., assignor to himself, Geo. F. McLellan, and James T. Benedict, Washington, D. C.
94,805.—Composition of Liquids for Tanning.—Ira Wood, Woodstock, Vt.
94,806.—Method of Hanging Top-sail Yards.—Joseph P. Woodbury, Portland, Me.
94,807.—Printers' Copy Holder.—W. H. Young and Chas. J. Young, Cambridge, Mass.
94,808.—Grinding Mill.—Abraham Briggs, Harrison, Ohio.
94,809.—Apparatus for Propelling Machinery.—Wm. Z. W. Chapman, New York city.
94,810.—Coffee Roaster.—Adolf Cohn, Louisville, Ky.
94,811.—Lamp Burner.—James R. Cole, Demopolis, Ala.
94,812.—Presser-foot for Sewing Machines.—Francisco B. Contessa, New York city.
94,813.—Torpedo for Oil Wells.—James Dickey, Venango City, Pa.
94,814.—Floor Gage.—Joel Fales, Cambridge, Mass.
94,815.—Wrought-iron Mold for Vulcanizing Rubber Car Springs.—Charles H. Franklin, Jersey City, N. J.
94,816.—Grinding-plate for Paper Pulp Engines.—Phineas Frost, Medfield, Mass.
94,817.—Hoisting Apparatus.—Ebenezer G. Green, East Gloucester, Mass.
94,818.—Floating Velocipede.—G. Haberland, Pontiac, Ill.
94,819.—Compound for Curing Corns, Bunions, etc.—John L. S. Hall, Wheeling, West Va.
94,820.—Hair Cutter.—George A. Harley, New York city.
94,821.—Water Wheel.—Joseph Hathaway, Woodstock, Vt.
94,822.—Clothes Dryer.—Martin R. Heliker, Norwalk, Ohio, assignor to Richard G. Elliott.
94,823.—Axle Box.—James B. Hendricks, Clayton, Ill.
94,824.—Picket Fence.—H. N. Hill, Pontiac, Mich.
94,825.—Stem-winding and Setting-attachment to Watches.—Vitalis Himmer, Brooklyn, N. Y.
94,826.—Suspended.
94,827.—Steam Generator.—Levi S. Ives, Pittsburgh, Pa.
94,828.—Portable Fence.—Charles E. Johnson, San Francisco, Cal.
94,829.—Sash Balance.—Jacob G. Jones, Baltimore, Md.
94,830.—Churn.—James King, Tuckasunny, N. J.
94,831.—Tobacco Pipe Stem.—Eduard Larssen, Stavanger, Norway.
94,832.—Compound of Hard Rubber and Fibrous Material.—R. O. Lowry, Salem, N. Y.
94,833.—Smelting Furnace.—William A. Madara, Spang's Mills, Pa.
94,834.—Carriage Axle Gage.—Modest Merk, Rochester, N. Y.
94,835.—Planter and Cultivator.—A. J. Misenhimer, Oskaloosa, Ill.
94,836.—Suspended.
94,837.—Boat-detaching Apparatus.—Charles H. Nye, Vineland, N. J.
94,838.—Machinery for Making Clothes Pins.—A. J. Ockington, Stratford Hollow, N. H.
94,839.—Carriage Wheel.—John A. Reed, New Market, N. J.
94,840.—Tooth Wash.—Pierre Riuypeyrou, San Francisco, Cal.
94,841.—Plow.—Nathaniel Robinson, Patchogue, N. Y.
94,842.—Velocipede.—M. L. Rood, Denver, Colorado Ter.
94,343.—Paper Pulp Engine.—Peleg Rose, Norwich, Conn.
94,844.—Arrangement of Gearing for Driving Agricultural Machinery.—T. Salisbury, Albion, Pa.
94,845.—Cooking Stove.—Robert Scorer, Troy, N. Y.
94,846.—Hay Loader.—J. G. Sehorn, Iowa City, Iowa.
94,847.—Cartridge for Artillery and Blasting.—Taliaferro P. Shaffner, Louisville, Ky.
94,848.—Washing and Wringing Machine.—Orin Skeel, Winslow, Ill.
94,849.—Porcelain Knob Machine.—Thomas J. Sloan, New York city.
94,850.—Dumping Wagon.—William H. Stearrett, Wilmington, Del.
94,851.—Machine for Forming Sheet-metal Pans.—Wm. A. Tarbutton, Harrisburg, Pa.
94,852.—Beefsteak Crusher.—Horace Thompson, Concord, N. H.
94,853.—Thill Coupling.—Thomas C. Walter, San Francisco, Cal.
94,854.—Rock Drill.—John M. Whartnaby, Philadelphia, Pa., assignor to himself and Samuel P. Faunce, same place, assignors to said Whartnaby and Francis Schnechter.
94,855.—Harrow.—James H. Williams, Tontzville, Kansas.
94,856.—Railway.—Charles G. Wilson, Brooklyn, N. Y.
94,857.—Machine for Punching Metal.—Joseph Allonas, (assignor to C. Aultman and H. H. Taylor), Mansfield, Ohio.
94,858.—Hobby Horse.—Lauritz Anderson, Chicago, Ill.
94,859.—Stove-pipe Shelf.—Charles H. Begley and Charles E. Mason, Elgin, Ill.
94,860.—Machine for Planing Metals.—R. A. Belden and E. H. Cutler, New Haven, Conn.
94,861.—Harness Fastening.—Adolph Bernd, Gustav Bernd, and Abner White, Macon, Ga., assignors to Adolph Bernd and Gustav Bernd
94,862.—Key-hole Guard.—David P. Bird, Richwood, Ohio.
94,863.—Press for Molding Glassware.—John Bird, Philadelphia, Pa.
96,864.—Chimney Top.—Thomas Boyd, Cambridge, Mass.
94,865.—Harvester.—C. J. Brackebush and C. E. Merrifield, Indianapolis, Ind.
94,866.—Window-shade Fixture.—Jabez Burns, New York city.
94,867.—Combination Square.—H. N. Burr, Mount Gilead, Ohio.
94,868.—Turbine Water Wheel.—John Chase, Paterson, N. J.
94,869.—Solution for the Treatment of Wood.—E. W. Clark, Hartford, Conn.
94,870.—Washer Cutter.—William A. Clark, Woodbridge, Conn.
94,871.—Harvester.—J. M. Connel, Newark, Ohio.
94,872.—Hot-air Register.—William G. Creamer, Brooklyn, N. Y.
94,873.—Loom.—Geo. Crompton, Worcester, Mass.
94,874.—Changeable Gage Railway Car Truck.—Lancelot Davidson, Brantford, Canada.
94,875.—Rotary Clod Fender.—L. M. Doddridge, New Mt. Pleasant, Ind.
94,876.—Steam Generator.—F. B. Dunn, New York city.
94,877.—Sheet Metal for Roofing and for other Purposes.—L. S. Enos, Almond, N. Y.
94,878.—Circular Saw Mill.—David Evans, Eureka, Cal.
94,879.—Section Roller and Marker Combined.—Elihu Evans, Denver City, Colorado Territory
94,880.—Manufacture of Beer, Ale, and other Fermented Liquors.—Joseph Firmenich, Buffalo, N. Y.
94,881.—Suspender Ends.—T. J. Flagg (assignor to Fisk, Clark & Flagg), New York city.
94,882.—Compound for Coating the Surfaces of Steam Boilers, etc.—W. A. French, Philadelphia, Pa.
94,883.—Compound for Coating the Surfaces of Steam Boilers, etc.—W. A. French, Philadelphia, Pa.
94,884.—Vacuum Still.—Henry Grogan, Flatbush, N. Y.
94,885.—Nut Fastener.—Manasseh Grover, Clyde, Ohio.
94,886.—Medical Compound.—C. L. Hammond, Java, N. Y.
94,887.—Combined Rake and Reel for Harvesters.—A. B. Hitchcock, Juneau, Wis.
94,888.—Ice Creeper.—C. Hoeller, Cincinnati, Ohio.
94,889.—Horse Rake.—Jesse Hudson, Charleston, Ill.
94,890.—Machine for Filing Saws.—Thomas M. Hustin, Orange, Ind.
94,891.—Combined High and Low-pressure Engines.—T. L. Jones, Natchez, Miss.
94,892.—Water Meter Adapted for Rotary Pumps.—Edmund Keith (assignor to himself, B. H. Colegrove, and C. B. Hutchins), Buffalo, N. Y.
94,893.—Fish Hook.—Francis Kemlo, Boston, Mass.
94,894.—Fish Hook.—Francis Kemlo, Boston, Mass.
94,895.—Fish Hook.—Francis Kemlo, Boston, Mass.
94,896.—Elevator.—J. T. Ketchledge, Burns, Mich.
94,897.—Blacking for Harness Leather, etc.—J. N. Knapp, Syracuse, N. Y.
94,898.—Apparatus for Carbureting Air.—J. F. Lafrogne, Paris, France.
94,899.—Velocipede.—Norbert Landry, San Francisco, Cal.
94,900.—Gate.—Wm. Leonard, Orleans, Ind.
94,901.—Ditching Machine.—Nathaniel B. Lewis, Hopewell, N. Y.
94,902.—Interfering Pad.—Walter A. Lovelace, Richmond, Mass.
94,903.—Cultivator.—E. P. Lynch, Davenport, Iowa.
94,904.—Knitting Machine.—J. McCune, Auburn, Ind.
94,905.—Fresh-air Apparatus.—John McNeven, New York city.
94,906.—Rotary Steam Engine.—L. H. Mitchell and Levi Stone, Mount Vernon, Ohio.
94,907.—Kettle for Boiling by Steam.—J. O. Morse, Englewood, N. J., and G. D. Hiscox, Brooklyn, N. Y.
94,908.—Preserving Animal and Vegetable Substances in Transit.—E. R. Norny, McDonough, Del., assignor to himself and Amos Carlisle, Philadelphia, Pa.
94,909.—Hay Fork.—J. A. Park (assignor to himself and Wm. Woodhouse), Lansing, Mich.
94,910.—Hand Corn Planter.—W. S. Pelham, Kirkville, Iowa.
94,911.—Furnace for Reducing Gold, Silver, Copper, and other Refractory Ores.—Wm. Quann, Philadelphia, Pa., assignor to himself, C. C. Lathrope, and A. R. Witmer.
94,912.—Thill Coupling.—B. R. Rapp (assignor to himself, E. Lane, and J. G. Maxwell), Philadelphia, Pa.
94,913.—Scaffold for Painters.—Jonas Rauch (assignor to himself and Frederick App), Selin's Grove, Pa.
94,914.—Clothesline Holder.—John Robbins, Centralia, Ill.
94,915.—Bustle.—D. G. Rollin, New York city.
94,916.—Water Wheel.—T. H. Russell, Northfield, Vt.
94,917.—Butter Tub.—A. C. Sawyer, Canton, N. Y.
94,918.—Harvester Cutter.—H. F. Shaw, West Roxbury, assignor to J. A. Woodbury, Boston, Mass.
94,819.—Saw Mill.—G. H. Shearer, Bay City, Mich.
94,920.—Die for Manufacturing Spring Callipers.—Noah C. Smith, Berlin, assignor to the Roys & Wilcox Company, East Berlin, Conn.
94,921.—Horse-power.—J. G. Stephenson, Bucyrus, Ohio.
94,922.—Attachment for Gas Burners.—R. N. Stewart, Philadelphia, Pa.
94,923.—Rock Drill.—J. P. Summers, Tiffin, Ohio.
94,924.—Sewing Machine Needle.—Hannah G. Suplee, San Francisco, Cal.
94,925.—Indicating Attachment to Weighing Scales.—Wm. F. Sweet, Jackson, Pa.
94,926.—Hook.—J. H. Tracy, Mayville, Mich.
94,927.—Velocipede.—C. M. Tyler, Indianapolis, Ind.
94,928.—Rustic Settee.—William P. Uhlinger, Philadelphia, Pa.
94,929.—Burglar Alarm.—J. N. Wells, Brooklyn, N. Y., assignor to himself, John S. Hull, and Jerome B. Bryant, Cincinnati, Ohio.
94,930.—Rest for Lathes for Turning Spheres.—Philipp Wenzel, Mayence-on-the-Rhine, Germany, assignor to Ignatius Hahn, Philadelphia.
94,931.—Clothes Boiler.—L. H. Whitney, Washington, D. C.
94,932.—Carriage Axle.—Joseph B. Wilson, Philadelphia, Pa., assignor to Eleanor Wilson, same place, and Henry M. Rile, Wilmington, Del.
94,933.—Thill for Carriages.—William W. T. Greenway, Baltimore, Md.

REISSUES.

54,111.—Children's Carriage.—Dated April 24, 1866; reissue 3,074, dated Aug. 11, 1868; reissue 3,636.—Andrew Christian, New York city.
83,367.—Fruit Jar.—Dated Oct. 27, 1868; reissue 3,637.—H. H. Collins, B. F. Collins, and Homer Wright, Pittsburgh, Pa., assignees of E. M. Davis.
50,536.—Metallic Cartridge.—Dated Oct. 17, 1865; reissue 3,638.—T. J Powers, New York city.
88,908.—Lock Nut.—Dated April 13, 1869; reissue 3,639.—Almon Roff, Southport, Conn.
56,044.—Composition for Rendering Paints Fire-proof.—Dated July 3, 1866; reissue 3,640.—J. O. Swinney, Glasgow, Mo., and A. H. Pollock, Germantown, Ky., assignees, by mesne assignments, of J. B. Harris.
Design No. 3,530.—Sole of a Boot or Shoe.—Dated June 1, 1869; reissue 3,641.—Michael Thornton, Philadelphia, Pa.

DESIGNS.

3,658.—Mourning Card.—E. J. Godfrey, New York city.
3,659.—Fireplace Heater.—E. S. Heath, Baltimore, Md.
3,660 and 3,661.—Oil Cloth.—C. T. Meyer, Newark, N. J., assignor to E. C. Sampson, New York city. Two patents.
3,662.—"Bit" of Chopping Axes.—Henry C. Reynolds, Manchester, N. H.
3,663.—Rustic Settee.—W. P. Uhlinger, Philadelphia, Pa.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,460.—Machine for Making Sewing Needles.—F. W. Mallett, New Haven, Conn. August 17, 1869.
2,468.—Loom.—N. A. Baldwin, Milford, Conn. August 18, 1869.
2,501.—Manufacture of Steel.—J. Baur, New York city. August 21, 1869.
1,683.—Gas Manufacture.—W. H. Gwynne, New York city, G. W. Harris, Elizabeth, N. J. May 31, 1869.
2,486.—Screw Propeller.—F. Wittram, San Francisco, Cal. August 19, 1869.
2,493.—Process of Manufacturing Paint.—S. R. Bradley, New York city. August 20, 1869.
2,499.—Springs for Four-Wheeled Vehicles.—Charles Shea and Henry Roberts, Newark, N. J. August 21, 1869.
2,508.—Apparatus for Raising Water.—E. Prall, Washington, D. C. August 23, 1869.
2,509.—Gas Lamp-post.—John W. Graham, Chillicothe, Ohio. August 23, 1869.
2,510.—Substitutes for Wood, Ivory, Stone, etc.—D. Blake, Albany, N. Y. August 23, 1869.
2,528.—Braiding Machine.—J. D. Butler, Lancaster, Mass. August 25 1869.
2,537.—Carding and Spinning Machinery.—John Goulding, Worcester Mass. August 26, 1869.

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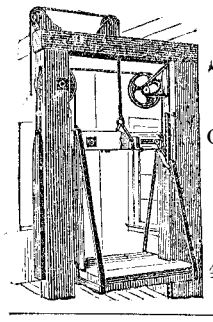

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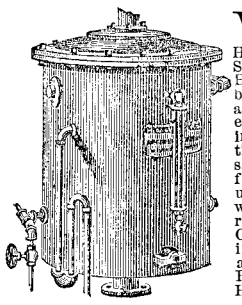

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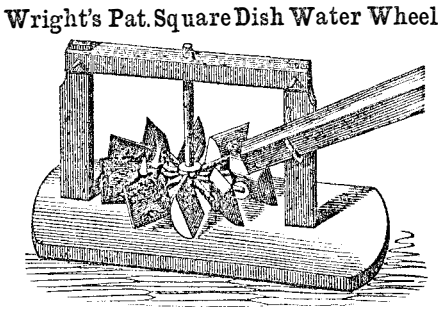

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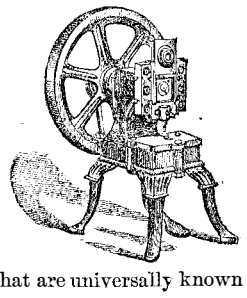

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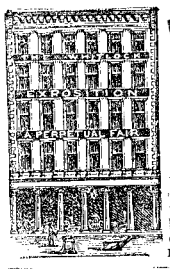

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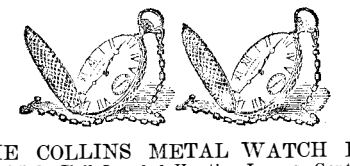

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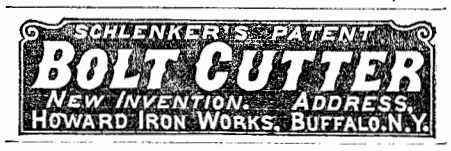

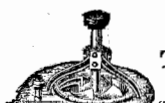

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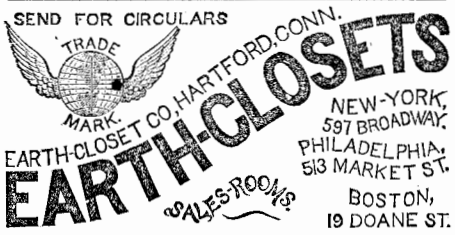

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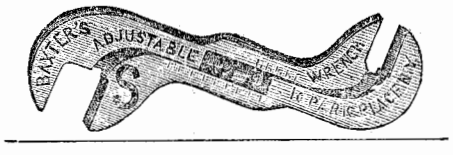

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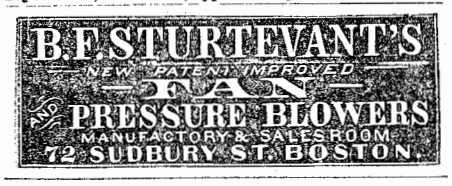

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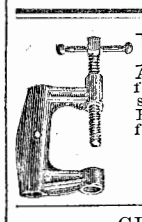

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